# REMEDIAL ACTION PLAN

# 4144 GLENCOE AVENUE SITE
# LOS ANGELES, CALIFORNIA 90292

Prepared on behalf of:

**Cornell-Dubilier Electronics, Inc.**

For Submittal to:

Department of Toxic Substances Control

**California Environmental Protection Agency**
**Department of Toxic Substances Control**
1011 North Grandview Avenue
Glendale, California 91201

Prepared by:


**GeoSyntec Consultants**
2100 Main Street, Suite 150
Huntington Beach, California 92648
(714) 969-0800
www.GeoSyntec.com


February 2006

Department of Toxic Substances Control

Agency Secretary
Cal/EPA

Maureen F. Gorsen, Director
1011 North Grandview Avenue
Glendale, California 91201

Arnold Schwarzenegger
Governor

February 21, 2006

Mr. Curtis L. Lopes
Corporate Facilities and Environmental Affairs Manager
1605 East Rodney French Boulevard
New Bedford, Massachusetts 02744

CORNELL-DUBILIER ELECTRONICS, REMEDIAL ACTION PLAN,
4144 GLENCOE AVENUE, LOS ANGELES, CALIFORNIA

Dear Mr. Lopes:

The Department of Toxic Substances Control (DTSC) has reviewed the Remedial Action Plan (RAP) dated February 2006 for the above mentioned site. DTSC has determined that the RAP satisfactorily addresses all applicable state and federal statutes and regulations and is hereby approved. Please ensure that a copy of the RAP and associated documents are available for public review in the repository for this Site.

If you have any questions, please contact Mr. Ryan Kinsella, Project Manager, at (818) 551-2961 e-mail Rkinsell@dtsc.ca.gov or me, at (818) 551-2822.

Sincerely,

Sara Amir

Sayareh Amir, Chief
Southern California Cleanup Operations Branch – Glendale Office

cc: Mr. Brian Hembacher
Deputy Attorney General
California Department of Justice
300 South Spring Street, Suite1703
Los Angeles, California 90013

Ms. Laurie Burt
Foley Hoag LLP, Attorneys at Law
Seaport World Trade Center West
155 Seaport Boulevard
Boston, Massachusetts 02210-2600

cc: Mr. Mark D. Schultheis, P.E.
GeoSyntec Consultants
2100 Main Street, Suite 150
Huntington Beach, California 92648

Mr. Gregory D. Trimarche, Esq.
Greenberg Traurig, LLP
650 Town Center Drive, Suite 1700
Costa Mesa, California 92626

Mr. Anthony C. Ward, PG
Vice President
Blasland, Bouck & Lee, Inc.
801 North Brand Boulevard, Suite 1120
Glendale, California 91203

Mr. David O. Bohn
Vice President
Bohn Brothers-Moultrie, Inc.
721 Santa Monica Boulevard
Santa Monica, California 90401

Mr. John M. Bohn
General Partner
Bradmore Realty Investment Co.
721 Santa Monica Boulevard
Santa Monica, California 90401

Mr. Mark Bohn
Property Manager
Bradmore Realty Investment Co.
4121 Redwood Avenue
Los Angeles, California 90066

# REMEDIAL ACTION PLAN

# 4144 GLENCOE AVENUE SITE
# LOS ANGELES, CALIFORNIA 90292

Prepared on behalf of:

**Cornell-Dubilier Electronics, Inc.**

For Submittal to:


**California Environmental Protection Agency**
**Department of Toxic Substances Control**
1011 North Grandview Avenue
Glendale, California 91201


Prepared by:


**GeoSyntec Consultants**
2100 Main Street, Suite 150
Huntington Beach, California 92648
(714) 969-0800
www.GeoSyntec.com


February 2006

# REMEDIAL ACTION PLAN

## 4144 Glencoe Avenue Site
## Los Angeles, California

**February 2006**

This report was prepared by the staff of GeoSyntec Consultants under the supervision of the engineer whose signature appears hereon. The findings or professional opinions were prepared in accordance with generally accepted professional engineering and geologic practice. No attempt to verify the accuracy of the data provided by third parties was made. No warranty is expressed or implied.


Mark D. Schultheis, P.E.
Associate

# EXECUTIVE SUMMARY

## Overview

This is the Remedial Action Plan (RAP) for 4144 Glencoe Avenue (Property) in Los Angeles, California. This RAP has been prepared by GeoSyntec Consultants (GeoSyntec) on behalf of Cornell-Dubilier Electronics, Inc. (CDE) for the Department of Toxic Substances Control (DTSC) in accordance with the California Health and Safety Code.

Soil and groundwater at the Property are contaminated. The area impacted by Property contamination, both on-Property and off-Property, is referred to hereinafter as the "Site."

## Purpose of the Remedial Action Plan

This RAP summarizes the results of the remedial investigations conducted at the Site and describes the remedial action (cleanup) plan to address contamination and potential risks associated with future use of the Property. Previous work for this Site has included remedial investigations (RI) into the nature and extent of contamination; a health risk assessment (HRA); and a feasibility study (FS) that evaluates various remedial action alternatives and presents the key components of the conceptual remediation plan in this RAP. These documents and other pertinent records that were considered in preparation of this RAP are summarized in the Administrative Record List (Appendix A). The Statement of Reasons that is included as Appendix B summarizes how the remedy presented in this RAP complies with HSC 25356.1. The Preliminary Non-Binding Allocation of Responsibility (NBAR) for this Property is also included in this RAP (Appendix C).

The community had the opportunity to comment on the Draft RAP through a 60-day public comment period and at the 25 October 2005 public meeting. DTSC received several comments and prepared a Responsiveness Summary to address each comment. The Responsiveness Summary is included as Appendix E to this RAP.

The RAP explains how Site contamination associated with the Property – primarily PCE, TCE and PCBs – will be effectively remediated through a comprehensive remedial plan. The preferred approach to cleanup involves: (1) excavating and transporting off Site the highest concentration of PCBs in the upper soils and in a certain column of soil down to the groundwater level; (2) removing high concentrations of volatile organic compounds (VOCs) from above and below the water table in a defined area by applying electrical resistive heating to the area and collecting the evaporated VOCs in carbon filters; (3) conducting a vapor survey after the remediation is complete; (4) implementing appropriate land use controls; and (5) monitoring the groundwater. Once these steps have been completed, there will be no significant risk to human health or the environment associated with the Site. There is currently no unacceptable risk associated with the off-Property portion of the Site.

## **Property Location and Description (*RAP Section 2*)**

The Property is located in the Venice District of Los Angeles, California on an approximately 1.4-acre lot located on the northeast side of Glencoe Avenue. The Property is bounded to the southwest by Glencoe Avenue, to the northwest by an alley and adjacent industrial property, and to the northeast and southeast by additional light industrial/commercial buildings, paved parking, and storage areas.

The Property vicinity includes light industrial and commercial use, with a recent increase in mixed-use consisting of commercial and multi-unit residential use. This redevelopment trend has accelerated dramatically in recent years, with several demolition and redevelopment projects completed or in progress in the Property area. Formerly, the Property vicinity and Glencoe Avenue were utilized predominantly for manufacturing and light industrial/commercial use (including offices, retail shops, gas stations, car rental centers, machine shops, automobile repair shops, public parking lots, and restaurants).

The Property was used for industrial purposes from 1955 to the early-1980s. It was first occupied by Cornell-Dubilier Electronics (CDE), a manufacturer of electronic components, from 1955 until 1971 and then by the Zenith Food Processing Company (Zenith), an industrial facility that coated fruit, and manufactured, repaired and refurbished machinery from 1972 until approximately 1984. Since the mid-1980s, the Property has been used for a variety of commercial uses. A fitness center and associated parking area currently are located at the Property.

**Remedial Investigation Summary (*RAP Section 3*)**

The nature and extent of contamination in soil, soil vapor, and groundwater have been assessed through several assessment programs conducted since 1986, as more fully described in the remedial investigation reports approved by DTSC in 2004.

Sampling results show that soil on-Property is primarily contaminated with perchloroethylene (PCE), trichloroethylene (TCE) and polychlorinated biphenyls (PCBs). PCE and TCE also were detected in the soil vapor. In addition, the groundwater in the upper aquifer (known as the A/B aquifer system) contains PCE, TCE and PCBs, with concentrations remaining stable or showing a decreasing trend. However, concentrations of PCBs initially detected in groundwater were found to be a result of analyzing turbid groundwater samples and not actual concentrations of PCBs dissolved in groundwater. The next lower aquifer, Aquifer C, shows no detectable concentrations of PCE, TCE or PCBs. Based on elevated concentrations of PCE and TCE, the RI concluded that solvent in the form of a dense non-aqueous phase liquid (DNAPL) was potentially present in the A/B aquifer system on the Property. Accordingly, additional investigation activities were completed in July 2004 through August 2004 to delineate the zone in which DNAPL may occur at the Property. The results of this work indicated probable DNAPL within the limited source zone at the Property (the “Source Zone”). The data show that contamination of groundwater occurs as a result of dissolution of DNAPL within the Source Zone and subsequent migration of PCE and TCE from the Source Zone as dissolved contaminants in groundwater. Groundwater monitoring conducted over the past seven years indicated stable levels of PCE and TCE contamination in the A/B aquifer system at, and downgradient of, the Property in the southwestern direction.

The potential for soil vapor to impact air quality inside the fitness center was evaluated during an air quality survey in July 1999 and a soil gas survey again in June 2005. The sampling results indicate that VOCs in soil vapor beneath the building do not pose a significant health risk to workers or visitors to the fitness center under current operating conditions.

Soil vapor sampling conducted in May 2005 at the Property and on locations immediately to the south of the Property confirms that the concentration of PCE and TCE in soil vapor generally decreases in a westerly direction under the building on the Property and that the soil vapor present beneath the building is due to movement of soil vapor away from the Source Zone. Elsewhere on the Property, soil vapor also appears to decrease away from the Source Zone, further indicating that the Source Zone is the main contributor of VOCs to soil vapor.

GeoSyntec notes that there has been significant research and discussion at both the national and international levels regarding the potential for cleanup of DNAPL at contaminated sites. This research and discussion occurred because of the broad experience that has now been developed in addressing DNAPL sites. A significant finding based on this experience is that DNAPL, when it occurs at a site, cannot be completely removed practicably through existing soil and groundwater remediation techniques. USEPA commissioned a panel to review available DNAPL site data and develop alternate cleanup and risk management strategies. The conclusions of this panel's work were recently published by USEPA. The panel concluded that DNAPL cleanup strategies generally should acknowledge the technical impracticability that precludes removal of all DNAPL at a site and the associated impracticability in meeting traditional cleanup standards for soil and groundwater impacted by DNAPL. According to USEPA, cleanup strategies instead should focus on practicable reduction of DNAPL source areas, with appropriate risk management of residuals through engineered and/or institutional controls and monitoring. This strategy is reflected in the remedial action objectives for the Site.

## Summary of Site Risks (*RAP Section 5*)

A risk assessment (RA) report was prepared to evaluate potential health risks associated with chemicals detected in soil, soil vapor, and groundwater at the Site. The RA was approved by DTSC in May 2004.

The results of the RA indicated that there is no unacceptable risk for current on-Property receptors, which include users of the gym, landscapers and utility workers, or current off-Property receptors including commercial workers and residents. The results of soil vapor sampling conducted in June 2005 and July 2005 indicate that there is no significant acute exposure and that the potential chronic health effect is within the range which agencies normally accept. After the RA was approved, additional potential development scenarios were suggested. Several potential exposure scenarios were evaluated, including the possibility of exposures to workers within a trench and the possibility of exposures within an underground parking structure. An exposure scenario was therefore developed specifically for the potential trench worker exposure, and an analysis of the exposure to users of an underground parking structure was prepared. The results of the trench worker analysis indicate that potential exposures to a trench worker do not result in an unacceptable risk. The results of the underground parking structure exposure also indicate that such an exposure would not present a significant risk if the garage were to be constructed with typical engineered controls. The documentation of these additional exposure scenarios is included in Exhibits 1 and 2 to the RAP.

Similarly, there is no immediate risk from potential vapor intrusion into buildings from VOCs north and south of the Property. Although this is the case, out of an abundance of caution and pursuant to DTSC direction, a sub-slab depressurization system is being implemented in certain buildings and suites to further eliminate or control potential vapor intrusion pending Property remediation.

The results of the RA also indicate that chlorinated VOCs and PCBs may pose an unacceptable health risk under a hypothetical future mixed use scenario (first-floor commercial/residential use and upper-floor residential use) in the absence of remediation and engineered and/or institutional controls. Accordingly, the remedial alternatives were developed to mitigate and/or control these potential risks.

**Summary of Feasibility Study and Evaluation of Alternatives (*RAP Section 6*)**

The Feasibility Study (FS) process, specified by the USEPA, is designed to provide sufficient information on potential remedial options so that informed decisions may be made. The FS process consists of developing remedial alternatives, screening these alternatives, and then performing a detailed analysis of the most applicable alternatives. Three remedial alternatives were reviewed through the detailed analysis process.

A summary of the remedial alternatives follows.

**Alternative 1, No Action**, consists of no remedial action, institutional controls or engineered controls to address soil, Source Zone, and groundwater exceeding the cleanup criteria for the Site. If applied, the Source Zone would not be remediated, groundwater would not be monitored, and a contingency plan would not be in place. Alternative 1 – No Action, was included as required by USEPA guidance.

**Alternative 2, Selective Excavation and Electrical Resistive Heating**, consists of a combination of shallow soil excavation and soil column excavation to meet the soil cleanup criteria for the Site as well as electrical resistive heating to focus on Source Zone / groundwater remediation.

Shallow soil excavation would be employed to remove PCBs in shallow soils, thereby mitigating incidental ingestion and dermal contact. The shallow soil excavation would remove PCBs greater than 17 mg/kg in the top ten feet of soil, resulting in a residual site-wide average of 6.4 mg/kg (acceptable commercial worker exposure). This concentration threshold for PCBs is based upon the DTSC-approved RA showing no unacceptable risk from PCBs at a site-wide average of 6.4 mg/kg. Removal of this volume of soil would eliminate over 95 percent of the PCBs identified in soils in the top ten feet of the Property. The total volume of shallow soils to be excavated under this scenario is approximately 900 cubic yards (CY).

The soil column excavation would consist of removing soils impacted with high concentrations of PCBs within a defined area in the Source Zone. A 20-foot diameter footprint was determined to encompass these high-concentration PCB-impacted soils. Removal of this soil column would eliminate over 92 percent of the PCB mass within the Source Zone.

Electrical resistive heating would be effective in both the vadose and saturated zones to focus on PCE and TCE mass removal in the Source Zone. The anticipated remediation area is approximately 30 feet in diameter. Electrical resistive heating would be applied from the ground surface to a depth of approximately 50 feet bgs (total depth of detected VOCs, including both the vadose and saturated zones).

**Alternative 3, Selective Excavation and In-Situ Chemical Oxidation**, consists of a combination of shallow soil excavation and soil column excavation activities to meet the soil cleanup criteria for the Site as well as in-situ chemical oxidation to focus on Source Zone / groundwater remediation.

The shallow soil excavation and soil column excavation would be employed in the same manner as described in Alternative 2 above. In-situ chemical oxidation would require delivery of chemical oxidants to the saturated zone to destroy DNAPL in the Source Zone. A batch solution of potassium permanganate would be injected into the saturated zone via wells. The wells would be screened throughout the saturated zone (from 20 feet bgs to 50 feet bgs), and the solution would then infiltrate into the surrounding saturated medium over time, oxidizing VOCs contained in groundwater. The potassium permanganate would be allowed to react in the aquifer for a period of time before low-flow purging and sampling would occur. COCs and degradation products would then be monitored to determine the degree of contaminant removal and thus technology effectiveness. This technology would not be effective in removing VOCs from vadose zone soils within the Source Zone.

## The Selected Remedy (*RAP Section 7*)

Based on the comparative analysis of the remedial alternatives detailed in Section 6, Alternative 2, Selective Excavation and Electrical Resistive Heating, ranks the highest, and was selected by DTSC for implementation. Alternative 2 will effectively mitigate the risk from ingestion, inhalation, and dermal contact with soils for future non-residential and residential occupants of buildings on the Property as well as future Property landscapers and utility/trench workers. Electrical resistive heating in the Source Zone will effectively treat the primary source of contamination on the Site, thereby mitigating potential indoor air exposures. Electrical resistive heating is the best technology available for the Property, as it is proven to achieve mass removal by directly attacking the PCE and TCE in the DNAPL; and by effectively removing contamination in finer-grained soils.

Based on the specific data within the Source Zone and groundwater, if electrical resistive heating cannot achieve RAOs, no other technology reviewed can do so either. Institutional and engineered controls also will prevent and mitigate the potential indoor air inhalation of any residual soil vapor of concern at the Property. Groundwater monitoring will be conducted to evaluate the effectiveness of remediation over time (i.e., to assess post-remedial concentrations for downward trends or any increase in VOC concentrations).

Potential PCB exposures to future landscapers and utility/trench workers would be mitigated through excavation of shallow soils. Additional mass removal of PCBs would be achieved through the removal of high-concentrations of PCBs in the soil column within the Source Zone. Alternative 2 would readily meet the criterion of overall protection of human health and the environment and would satisfy ARARs. When evaluated against the balancing criteria, Alternative 2 would provide short-term effectiveness as well as long-term effectiveness and permanence. It also would reduce the toxicity, mobility, and volume of COCs in soil and in groundwater. It would be readily implementable and presents an effective balance of cost against the other criteria. Alternative 2 also would do the best job of accommodating future redevelopment of the Property.

## Public Involvement

The Draft RAP was made available for public comment, in accordance with HSC Section 25356.1(e) for a period of 60 days. At the request of the Property owner, the public comment period was extended by 30 days from the initially-planned 30 days. During the public comment period, DTSC sought public input on the Draft RAP and on the CEQA documents. DTSC held a public meeting during the public comment period, on 25 October 2005. The purpose of this public meeting was to present:

- An assessment of the degree of contamination (i.e., the findings of the RI).

- The risks to human health and the environment posed by site conditions.

- A discussion of all alternatives considered, including those rejected.

- A description of the selected removal or remedial actions.

- An estimate of the time required to perform the remedial actions.

- The rationale for selection of the selected remedial actions.

At the end of the public comment period, DTSC responded to written comments received in a document called a “Responsiveness Summary.” The Responsiveness Summary is included as Appendix E to this RAP.

# TABLE OF CONTENTS

**TABLE OF CONTENTS (continued)**

**Page**

## TABLE OF CONTENTS (continued)

**Page**

## TABLE OF CONTENTS (continued)

TABLES



FIGURES

**TABLE OF CONTENTS (continued)**

# 1. INTRODUCTION

This RAP is prepared for the 4144 Glencoe Avenue (Property) in Los Angeles, California. There is soil and groundwater contamination associated with the Property. The area impacted by Property contamination, both on-Property and off-Property, is referred to hereinafter as the "Site." The RAP explains how Site contamination associated with the Property - primarily PCE, TCE and PCBs - will be effectively remediated through a comprehensive remedial plan. The preferred approach to cleanup involves (1) excavating and transporting off site the highest concentration of PCBs in the upper soils and in a certain column of soil down to the groundwater level; (2) removing high concentrations of volatile organic compounds (VOCs) from above and below the water table in a defined source zone by heating the area and collecting the evaporated VOCs in carbon filters; (3) conducting a vapor survey after the remediation is complete; (4) implementing appropriate land use controls; and (5) monitoring the groundwater. Once these steps have been completed, there will be no significant risk to human health or the environment associated with the Property.

## 1.1 Terms of Reference

This RAP was prepared by GeoSyntec Consultants (GeoSyntec) on behalf of Cornell-Dubilier Electronics, Inc. (CDE) for submittal to the Department of Toxic Substances Control (DTSC) in accordance with California Health and Safety Code Section 25356.1, and the Official Remedial Action Plan Policy, Document #EO-95-007-PP [DTSC, 1995].

## 1.2 Report Organization

The remainder of this RAP is organized as follows:

- Section 2, *Background*, describes the Site setting and history;

- Section 3, *Summary of Remedial Investigations*, summarizes the Remedial Investigation activities that were performed at the Site;

- Section 4, *Summary of Removal Actions*, documents Site removal actions;

- Section 5, *Summary of Site Risks*, summarizes risks that are associated with the Site impacts;

- Section 6, *Summary of Feasibility Study and Evaluation of Alternatives*, describes alternatives that were evaluated as part the Feasibility Study and the resulting preferred remedial alternative;

- Section 7, *Recommended Site Remediation*, describes the components of the preferred remedial alternative; and

- Section 8, *Future Site Activities*, describes the future Site activities associated with the selected remedial alternative.

References, tables, figures, and appendices are included at the end of the RAP. Documents and other pertinent records that were considered in preparation of this RAP are summarized in the Administrative Record List (Appendix A). The Statement of Reasons that is included as Appendix B summarizes how the remedy presented in this RAP complies with HSC 25356.1. The Preliminary Non-Binding Allocation of Responsibility (NBAR) for this Site is also included in this RAP (Appendix C).

# 2. PROPERTY BACKGROUND

## 2.1 General

This section includes the following background information:

- Property Location and Description;
- Property History; and
- Regulatory Involvement.

The information presented in this section generally has been excerpted from the Groundwater Remedial Investigation report [URS, 2004a].

## 2.2 Property Location and Description

The Property is located in the Venice District of Los Angeles, California (Figure 2-1) on an approximately 1.4-acre lot located on the northeast side of Glencoe Avenue. The current property configuration consists of a fenced parking area, a building structure which is operated as a fitness center, and landscaped frontage. The Property is bounded to the southwest by Glencoe Avenue, to the northwest by an alley and adjacent industrial property, and to the northeast and southeast by additional light industrial buildings, paved parking, and storage areas [URS, 2004a]. The Property layout is presented on Figure 2-2.

The Property vicinity includes light industrial and commercial use with a recent increase in commercial and multi-unit residential use. This redevelopment trend has accelerated dramatically in recent years, with several demolition and redevelopment projects completed or in progress on Glencoe Avenue and on Redwood Avenue between Maxella Avenue to the south and West Washington Boulevard to the north. Formerly, the Property vicinity was utilized primarily for light industrial/commercial use (including offices, retail shops, gas stations, car rental centers, machine shops, automobile repair shops, public parking lots, and restaurants) and residential area (including multi-story apartment complexes). There are no single-family residences along Glencoe Avenue or on the west side of Redwood Avenue in the Property vicinity.

Southwest of the Property is a commercial shopping center, including a Gelson's Market and Sporting Goods store. Apartment complexes and residential homes are located on streets to the west of the commercial and light industrial areas across from the Property. Figure 2-3 illustrates the land use in the Property vicinity.

## 2.3 Property History

The Property was used industrially from 1955 to the early 1980s. It was occupied by CDE from 1955 until 1971 and then by the Zenith Food Processing Company (Zenith) from 1972 until approximately 1984. Since the mid-1980s, the Property has been used for a variety of commercial uses. During the period when CDE occupied the property, the Property consisted of a main structure of approximately 15,000 $ft^2$, a small concrete platform behind the main building, a shed, and parking areas (Figure 2-2). The parking areas reportedly were completely paved prior to the mid-1960s [URS, 2004a].

The manufacturing operations within the main structure included five production rooms, a laboratory, a prototype department, a quality control room, and office areas. CDE's manufacturing activities consisted of assembling various types of electronic filters and capacitors, which included impregnating the filters and capacitors with oil, and vapor degreasing associated with cleaning assembled capacitors. For an undetermined portion of this manufacturing period, polychlorinated biphenyls (PCBs) were used in the manufacture of some capacitors and filters. The vapor degreasing operation was conducted by using either trichloroethylene (TCE) or 1,1,1-trichloroethane (1,1,1-TCA). CDE reportedly has no record of using tetrachloroethene (PCE) in any of its processes on the Property [URS, 2004a] and believes that its equipment at the Property was not designed to use PCE.

From approximately 1972 to 1984, Zenith conducted industrial operations at the property that included formulation of a wax material used to coat fruit, and the manufacture of machinery used to sort, wash, size, and coat fruits and vegetables. Zenith also repaired and refurbished food processing machinery at this facility. Zenith used and stored various solvents and paints at the facility during its repairing and refurbishing operations [URS, 2004a].

## 2.4 Regulatory Involvement

In 1997, DTSC issued an Imminent and Substantial Endangerment Determination and Remedial Action Order (Docket No. I&/SE-96/97-004) to CDE. The responsible parties identified in the Order were directed to conduct a Remedial Investigation/Feasibility Study (RI/FS), prepare a RAP, and design and implement the remedy approved in the RAP. The RI comprises three separate reports: the Groundwater Remedial Investigation Report [URS, 2004a]; the Revised Soil Remedial Investigation Report [URS, 2004b]; and the Supplemental Soil Remedial Investigation Report [URS, 2004c]. In 2005, DTSC approved the Feasibility Study (FS) Report for the Property, and a Supplemental FS Report. DTSC also has approved the CEQA Initial Study and has prepared a Negative Declaration for the project.

# 3. SUMMARY OF REMEDIAL INVESTIGATION

## 3.1 General

The nature and extent of impacts to soil, soil vapor, and groundwater at and surrounding the Property have been assessed through several programs conducted since 1986. The following sections provide a summary of findings for each of these media and include the following information:

- Soil Assessment Results;
- Soil Vapor Assessment Results;
- Groundwater Assessment Results;
- Source Zone Assessment Results; and
- Pre-Remedial Design Results.

The information presented in this section generally has been excerpted from the Groundwater Remedial Investigation Report [URS, 2004a], the Revised Soil Remedial Investigation Report [URS, 2004b], and the Supplemental Feasibility Study Report [GeoSyntec, 2005b].

## 3.2 Soil Assessment Results

The RI was conducted to assess the lateral and vertical extent of chemicals of concern (COCs) in soil at the Property. The Revised Soil RI was conducted in a phased approach, with the scope of successive phases based on the findings of the preceding phase. Six soil assessments were performed to assess the possibility and extent of soil impacts at the Property. During the first three soil assessments, more than sixty soil borings were advanced up to a maximum depth of 34.5 feet below ground surface (bgs) and sampled for PCBs, VOCs, SVOCs, and metals. The soil borings and sampling locations can be seen in Figure 3-1.

The most prevalent COCs detected were PCBs, PCE and TCE [URS, 2004b]. Soils containing PCBs were found primarily within an area approximately 50 ft × 50 ft located approximately 50 feet east of the main building. Of the 31 soil samples containing PCBs at concentrations greater than 50 milligrams per kilogram (mg/kg), 27 were collected from this central location. The remaining four samples containing PCB concentrations greater than 50 mg/kg were found in borings located in close proximity to the primary area of PCB-impacted soil and in areas to the east of the impacted region, representing shallow and laterally limited areas of PCB-impacted soil [URS, 2004b].

TCE was generally detected at concentrations lower than PCE. In addition, TCE was generally co-located with PCE. Concentrations of PCE and TCE ranged from 0.01 to 2,100 mg/kg, with the highest concentrations located in the area where PCB concentrations were highest [URS, 2004b].

Additional soil assessment activities were performed in three phases during 1998 and 1999. During the 1998 sampling, seventy-nine samples were collected and analyzed for PCBs, SVOCs, and metals. PCBs (specifically Aroclor 1254) were detected in sixteen of the seventy nine samples at low concentrations (0.0091 to 1.0 mg/kg). SVOCs were not detected in soil samples collected. The results of the metal analyses were compared to background concentrations for metals in California soil. Arsenic, lead and selenium were found at concentrations greater than background, but not high enough to become chemicals of concern [URS, 2004b].

In 1999, additional soil samples were obtained from beneath the main building on the Property to assess additional areas under the building. Soils were sampled for PCBs and VOCs. None were detected [URS, 2004b].

As reported by URS, the results of the soil RI indicate that soil in an area approximately 50 feet by 50 feet has been impacted by PCBs and VOCs, primarily PCE and TCE. This 50-foot by 50-foot area is located about 50 feet east of the main building beneath the current parking lot. Other areas of the Property are largely unaffected by soil impacts [URS, 2004a].

## 3.3 Soil Vapor Assessment Results

From 1986 to 1999, more than 70 soil vapor probes were advanced and sampled at the Site. The soil vapor sampling locations can be seen in Figure 3-2. An additional soil vapor assessment was conducted in 2005 [GeoSyntec, 2005b]. A discussion of the soil vapor assessment results is found below.

Soil vapor surveys were performed to assess the potential presence of VOCs in soil vapor to the south and east of the main building. Twelve soil vapor samples were collected at seven locations (see Figure 3-2) and analyzed for VOCs. PCE and TCE were detected in all twelve soil vapor samples at concentrations from 0.098 to 0.880 milligrams per liter (mg/L) and from 0.012 to 0.940 mg/L, respectively. The highest concentrations detected during the initial soil vapor assessment were located in the area where the concentrations of VOCs in soil were the highest (SG-1 and SG-2) [URS, 2004b].

Additional soil vapor sampling was performed in May 1999 to evaluate soil vapor concentrations beneath the northeastern and southeastern portions of the building. The results of the analysis indicated elevated concentrations of PCE and TCE [URS, 2004b]. In August 1999, additional soil vapor samples were collected to investigate additional areas under the building and to further assess the extent of elevated soil vapor concentrations in the southeastern corner of the building. Soil vapor samples were collected at nine locations and analyzed for VOCs. The results of the analysis indicated that the levels of VOCs in soil vapor beneath the building rapidly decrease in a westerly direction from the southeast corner [URS, 2004b].

Sampling conducted in 2005 focused on assessing whether there were additional concentrated areas of VOCs in soil at the Property, particularly beneath the former manufacturing building and in areas south of the building in the current parking lot of 4144 Glencoe Avenue [GeoSyntec, 2005b]. The field activities included the sampling of 23 locations. PCE concentrations are shown on Figure 3-3 while TCE concentrations are shown on Figure 3-4. Soil vapor samples were collected from a depth of 5 ft bgs at each location.

PCE and TCE were detected in all 23 soil vapor samples at concentrations ranging from 15 micrograms per liter (ug/L) to 2,000 ug/L and from 16 ug/L to 1,400 ug/L, respectively. The highest concentrations detected during the soil vapor assessment were located approximately 70 feet east of the 4144 Glencoe Avenue building (Figures 3-3 and 3-4).

GeoSyntec performed sub-slab sampling of soil vapor beneath the building located at 4208 Glencoe Avenue on June 16, 2005. Sampling protocol followed DTSC's vapor intrusion guidance [DTSC, 2004]. Two sub-slab soil vapor samples (CSV-24 and CVS-25) were collected beneath the building. PCE and TCE were detected in the sub-slab vapor samples at concentrations ranging from 284.8 to 1,452.8 ug/L, and 64.5 to 462.2 ug/L, respectively.

The concentrations of PCE and TCE found in soil vapor under the building slab of 4208 Glencoe Avenue initiated follow up sub-slab soil vapor sampling beneath the buildings located at 4204 and 4206 Glencoe Avenue (CSV-26 through CSV-28). PCE and TCE were detected in the soil vapor samples ranging from 7.1 to 1,200 ug/L, and from non-detect (ND) to 500 ug/L, respectively.

Soil vapor samples indicate that the primary VOCs contained in soil vapor are PCE and TCE, consistent with the results of soil sampling and analyses at the Property. Elevated concentrations of PCE and TCE were detected in soil vapor samples collected from under the southeastern portion of the main building. The concentration of PCE and TCE in soil vapor generally decreases in all directions away from the Source Zone and that the soil vapor present beneath the building is due to movement of soil vapor away from the Source Zone.

### 3.3.1 Indoor Air Quality Survey

Two surveys for indoor air quality were conducted. In 1999, the potential for soil vapor to impact the air quality inside the main building on the Property was evaluated. A total of eight samples were collected at four sample locations during the two-day sampling effort. Three sampling locations were situated within the building, and one sampling location was situated outdoors in an upwind direction [URS, 2004b].

The results of the analyses were compared with OSHA PELs to determine whether current users of the main building are exposed to unacceptable risk. As documented in a report submitted to the DTSC, based on the July 1999 sampling data there is no unacceptable health risk to building occupants as the building is currently operated.[URS, 2004b].

Ambient air samples were also collected from the exterior and interior of 4204 Glencoe, 4206 Glencoe, 4208 Glencoe, and three suites within the 4212-4222 Glencoe building (4218 #4, 4216½, and 4216¾ Glencoe) in 2005. The VOCs detected at the greatest concentrations were PCE and TCE, with PCE concentrations being higher. The concentrations of PCE and TCE detected in the indoor air samples ranged from 2.7 to 73 microgram per cubic meter (ug/$m^3$) and from 0.84 to 19 ug/$m^3$, respectively. The concentrations of PCE and TCE detected in the ambient air samples ranged from 0.38 to 0.82 ug/$m^3$ and from 0.098 to 0.25 ug/$m^3$, respectively.

The results of the indoor air sampling showed that, as expected, there was no significant acute exposure. A chronic health effect was calculated over a duration of 25 years for an exposure period of 12 hours per day at 4204 Glencoe, 4206 Glencoe, 4208 Glencoe, and 4216¾ Glencoe. This calculation resulted in a potential cancer risk from PCE exceeding $1 \times 10^{-5}$ in these suites, but within the risk range of $1 \times 10^{-4}$ to $1 \times 10^{-6}$, which is the range over which agencies generally exercise risk management discretion. In the other two suites sampled (4218 #4 Glencoe and 4216½ Glencoe), no chronic health effect in excess of a baseline cancer risk of $1 \times 10^{-5}$ was found for PCE or TCE.

Despite the favorable risk calculations, out of an abundance of caution DTSC required, and CDE is implementing, certain engineered control measures. Specifically, CDE is implementing a sub-slab depressurization system in specific buildings south of the Property. These measures will serve to eliminate or control vapor intrusion and, therefore, reduce even further concern for any commercial chronic risk exposure pending implementation of the remedy. The details of this sub-slab depressurization system have been provided to DTSC.

## 3.4 Groundwater Assessment Results

The groundwater RI was conducted to assess Site hydrostratigraphy and the lateral and vertical extent of COCs in groundwater beneath and downgradient of the Property. The groundwater RI was conducted in a phased approach, with the scope of successive phases based on the findings of preceding phase. The groundwater RI included the collection of samples from more than thirty temporary well points advanced with CPT soundings, from four groundwater monitoring wells in the A/B aquifer system, and from three groundwater monitoring wells in Aquifer C (Figure 3-6).

### 3.4.1 Summary of Hydrostratigraphy

Groundwater occurs at approximately 19 feet bgs to 21 feet bgs (approximately 2 feet above mean sea level). Groundwater first occurs in Aquifer A, which consists mainly of sand and gravelly sand and appears to range from 5 feet to 10 feet in thickness beneath the Site. Aquifer B is separated from the overlying Aquifer A by several low-permeability layers that appear to be discontinuous. Aquifer B consists of mainly sand, gravel, and cobbles and appears to range from 15 feet to 20 feet in thickness. Available data indicate that groundwater in Aquifers A and B is in hydraulic communication, and it is assumed that the flow direction and gradient of groundwater in Aquifer B is the same as Aquifer A. Aquifer C is separated from the underlying Aquifer B by a low-permeability layer that appears to be continuous in the immediate Property vicinity. Aquifer C, which consists of fine to medium-grained sand, is approximately 200 feet thick in the Property vicinity. The depth to its base is approximately 250 feet to 300 feet bgs. Groundwater monitoring wells in Aquifer C indicate groundwater flows very slowly toward the south.

### 3.4.2 Summary of Groundwater Assessments Results

Groundwater evaluation, which began in 1986, shows that the most prevalent COCs detected in groundwater were PCE, TCE and PCBs. However, concentrations of PCBs detected in groundwater were found to be a result of analyzing turbid groundwater samples and not actual concentrations of PCBs dissolved in groundwater. PCBs were not detected in any of the groundwater samples colleted from Aquifers A or B during the Groundwater RI [URS, 2004a].

The locations of the monitoring wells and the concentration and distribution of chemical constituents detected during 1987 and 1996 sampling events are presented on Figure 3-7. The initial phase of the groundwater RI consisted of advancing and sampling eight CPT soundings, six on Property and two off Property on Glencoe Avenue. Results of the sampling and analysis indicate that deeper samples contained higher concentrations of PCE and TCE than shallower samples. The highest concentrations of PCE and TCE detected occurred in Aquifer B (41 mg/L of PCE and 140 mg/L of TCE) at a location southeast of the initial CPT soundings, along the southern border of the Property.

Three groundwater monitoring wells were installed in Aquifer C (Figure 3-6). Samples did not contain VOCs at concentrations above their respective detection limits, indicating that groundwater within Aquifer C has not been impacted.

CPT soundings were advanced from the source area to approximately 1,500 ft downgradient of the Property (near the Marina Expressway) to assess the downgradient and cross gradient extent of VOC-impacted groundwater in the A/B aquifer system. Results of the testing indicated the narrow plume of total chlorinated compounds that is shown on Figure 3-8. The plume is approximately 500 feet wide and 2,000 feet long, as defined by its 0.1 mg/L isoconcentration line. PCE and TCE concentrations at the southern extent of the total chlorinated compound plume in Aquifer A were 0.062 mg/L and 0.17 mg/L, respectively, and 0.03 mg/L and 0.06 mg/L, in Aquifer B. These data imply that the impacts in the downgradient portion of the plume are greater in shallower Aquifer A. The estimated southern extent of total chlorinated compound impacts occurs about 2,000 feet south of the source area, based on the 0.1 mg/L isoconcentration line.

## 3.5 Source Zone Assessment Results

Concentrations of PCE and TCE in groundwater represent more than twenty-five percent of the effective solubility for PCE and fifteen percent for TCE, which are strong indicators of the presence of dense non-aqueous phase liquids (DNAPLs). Accordingly, additional Property investigation activities were completed in 2004 to delineate the zone in which DNAPL may occur at the Property. The results of this work showed indications of DNAPL within the limited zone shown in Figure 3-9. This zone, which includes both vadose zone soils above the groundwater table as well as groundwater in the A/B aquifer system, is referred to hereinafter in this RAP as the "Source Zone." The Source Zone is defined as the region in which DNAPL may be present, either as randomly distributed sub-zones at residual saturations or as pools of accumulation above confining units. The Source Zone includes the volume of the aquifer that has had contact with free-phase DNAPL at one time as well as overlying vadose soils which may contain DNAPL. Contamination of groundwater is believed to occur as a result of dissolution of DNAPL within the Source Zone and subsequent migration of PCE and TCE from the Source Zone as dissolved contaminants in groundwater.

GeoSyntec notes that there has been significant research and discussion at both the national and international levels regarding the potential for cleanup of DNAPL at contaminated sites. This research and discussion occurred because of the broad experience that has now been developed in addressing DNAPL sites. A significant finding based on this experience is that DNAPL, when it occurs at a site, cannot be completely removed practicably through existing soil and groundwater remediation techniques. USEPA commissioned a panel to review available DNAPL site data and develop alternate cleanup and risk management strategies. The conclusions of this panel's work were recently published by USEPA [USEPA, 2003]. The panel concluded that DNAPL cleanup strategies generally should acknowledge the technical impracticability that precludes removal of all DNAPL at a site and the associated impracticability in meeting traditional cleanup standards for soil and groundwater impacted by DNAPL. According to USEPA, cleanup strategies instead should focus on practicable reduction of DNAPL source areas, with appropriate risk management of residuals through engineered and/or institutional controls and monitoring [USEPA, 2003]. This strategy is reflected in the remedial action objectives (RAOs) for the Site, which are discussed in Section 5 of this RAP.

# 4. SUMMARY OF REMOVAL ACTIONS

## 4.1 General

Removal actions have not been performed on the Property. There is evidence in Property records of grading and some excavation done in the area of, and south of, the Source Zone to accommodate paving of the Property.

# 5. SUMMARY OF SITE RISKS AND REMEDIAL ACTION OBJECTIVES

## 5.1 General

The development of remedial action objectives (RAOs) is required by USEPA guidance as part of the Feasibility Study (FS) process [USEPA, 1988]. RAOs consist of goals specific to various media for protecting human health and the environment. RAOs generally are expressed in terms of contaminant levels and routes of exposure, so that they can be achieved through a combination of reducing contaminant levels and/or reducing exposure to contaminants. The process of developing RAOs for the Site depends upon the assessment of risk to identified receptors from various contaminants present at the Site. This section describes the following for the Site:

- Summary of Risk Assessment;
- Chemicals of Concern;
- Remedial Action Objectives;
- Future Property Use; and
- Cleanup Criteria.

## 5.2 Summary of Risk Assessment

A risk assessment (RA) was performed to evaluate potential health risks associated with chemicals detected in soil, soil vapor, and groundwater at the Site. The RA was approved by DTSC in May 2004.

Potential receptors for on-Property and off-Property exposure scenarios at the Site were identified in the RA by evaluating the current and future land use of the Property and off-Property areas. The RA addressed potential exposures to on-Property landscapers and utility/trench workers, off-Property commercial workers, and off-Property residents under a current exposure scenario, as well as to hypothetical future on-Property residents and hypothetical future on-Property landscapers and utility/trench workers. The specific future use scenario assessed a mixed-use development described in Section 5.5 below. Potential exposures to chemicals detected in shallow soils (from 0 feet bgs to 10 feet bgs) were evaluated for the direct contact pathways, as well as inhalation of outdoor air vapors and fugitive dust. The exposure pathways and scenarios for each identified receptor at the Site are discussed in the RA [GeoSyntec 2004]. The results for the evaluated receptors are discussed below.

### 5.2.1 Results for Current Receptors

The results of the RA indicated that there is no unacceptable risk for current Site receptors, which include users and employees of the fitness center, landscapers and utility/trench workers, or current off-Property receptors including commercial workers and residents. Cancer risks and noncancer hazards for current on-Property landscapers and utility/trench workers potentially exposed to indoor air vapors in the existing fitness center were not evaluated due to the prior evaluation of indoor air samples collected in July 1999 that determined no adverse impact from subsurface contamination. Cancer risks and noncancer hazards for current off-Property commercial workers potentially exposed to indoor air vapors in a commercial establishment located in a subterranean parking garage were evaluated and found to be below the target health goals of $1 \times 10^{-5}$ and 1.0, respectively. Estimated cancer risks and noncancer hazards for current off-Property residents potentially exposed to indoor air vapors in a first-floor residence above a subterranean parking garage were below $1 \times 10^{-6}$ and 1.0, respectively [GeoSyntec, 2004].

### 5.2.2 Results for Hypothetical Future Receptors

The results of the RA indicate that chlorinated VOCs and PCBs may pose an unacceptable health risk (greater than $1 \times 10^{-6}$) under a future, upper-floor residential use scenario in the absence of remediation and engineered and/or land use controls. In addition, PCE and PCBs may pose an unacceptable health risk (greater than $1 \times 10^{-5}$) to future on-Property landscapers and utility/trench workers. Therefore, the following potential future exposure pathways would require mitigation depending on the future land use of the Property:

- Inhalation of vapors from Site media (hypothetical future residents, landscapers, utility/trench workers, users of an underground parking structure and possibly off-Property commercial workers);

- Incidental ingestion and dermal contact with on-Property shallow soils and inhalation of outdoor air fugitive dust/vapors (hypothetical future landscaper and utility/trench workers; and

- Ingestion of groundwater.

The RA presented an analysis of the potential future health risk for on-Property landscapers and utility workers, but not specifically for trench workers or users of an underground parking structure. Because of the potential for trench worker exposures or underground parking structure exposures to be associated with future Site development, a scenario addressing each potential exposure has been developed. These scenarios are included in this RAP. Exhibit 1 presents the analysis for the trench worker, and Exhibit 2 presents an analysis of the effectiveness of engineered controls for the occupants of a hypothetical mixed use non-residential/residential building, including the underground parking structure user.

### 5.2.3 Results of Ecological Evaluation

The results of the RA screening-level ecological assessment show that groundwater chemical concentrations were below the chronic screening criteria. This indicates that the current chemical concentrations at the leading edge of the groundwater plume would not adversely impact aquatic receptors [GeoSyntec, 2004]. Therefore, there is currently no unacceptable ecological risk, as agreed by the DTSC upon approval of the RA.

## 5.3 Chemicals of Concern

Following completion of the RA, primary risk driving chemicals were identified as COCs because they are the most ubiquitous chemicals throughout the Site. Specific COCs for the Site are the following:

- Soil COCs include PCBs, PCE and TCE;
- Soil vapor COCs include PCE and TCE; and
- Groundwater COCs include PCE and TCE.

As discussed in Section 2.3, PCBs and TCE were used in CDE Property operations. However, CDE reportedly has no record of using PCE in any of its processes on-Property [URS, 2004a] and believes that its equipment at the Property was not designed to use PCE.

## 5.4 Remedial Action Objectives

RAOs are goals specific to various media and apply to those media that have been identified as posing an unacceptable risk based on the RA work performed at the Site. RAOs are identified below for on-Property soils, groundwater, and Source Zone in the Feasibility Study (FS) Report [GeoSyntec, 2005a]. These media are considered for remedial action in this RAP. Based on the previous RI investigations and the RA, there is no significant risk for current Property uses; therefore, the RAOs are based on future hypothetical receptors.

The RAOs developed for the Site consider the presence of DNAPL in the Source Zone, as described in Section 3.5. Also, as discussed in Section 3.5, the studies concerning DNAPL have concluded that DNAPL cleanup strategies generally should acknowledge the technical impracticability of removing all DNAPL at a site and the associated impracticability in meeting traditional cleanup standards for soil and groundwater impacted by DNAPL. According to USEPA, cleanup strategies instead should focus on practicable reduction of DNAPL sources, with appropriate risk management of residuals through engineered and/or institutional controls and monitoring [USEPA, 2003]. This strategy is reflected in the RAOs for the Site, which follow.

One RAO specifically addresses soils at the Site:

- Reduce risk from ingestion, inhalation, and dermal contact with soils to risk levels of $<1 \times 10^{-5}$ for future landscapers and utility/trench workers. In addition, reduce risk so that the associated noncancer hazard index (HI) is <1.

Other RAOs are focused on the Source Zone on the Property and groundwater at the Site, along with the soil vapor that is associated with the Source Zone:

- Reduce VOCs through application of appropriate in-situ remedial technology in the Source Zone of known high VOC concentrations.

- Provide adequate controls to reduce indoor air exposure to chlorinated VOC soil vapor concentrations to risk levels of $<1 \times 10^{-6}$ for future on-Property residents. In addition, reduce risk so that the associated noncancer HI is <1.

- Manage the residual dissolved phase plume to limit future risk to off-Property receptors: maintain risk levels of $<1 \times 10^{-6}$ for future off-Property residents, and $<1 \times 10^{-5}$ for future landscapers and utility/trench workers; associated non-cancer hazard index of <1.

- Manage residual dissolved phase plume to demonstrate acceptable future risk to on-Property receptors: risk levels of $1 \times 10^{-6}$ for future on-Property residents and $1 \times 10^{-5}$ for future landscapers and utility/trench workers.

- Manage the residual dissolved phase plume so that chemical concentrations continue to exhibit insignificant risk to ecological receptors downgradient of the Property.

- Manage the residual dissolved phase plume so that the deep aquifer (Aquifer C) beneath the Site is protected.

## 5.5 Future Property Use

Land use at the Property and in the vicinity of the Property is in transition from light industrial and commercial use to mixed-use, consisting of mixed commercial / non-residential and residential use. This redevelopment trend has accelerated dramatically in recent years, with several demolition and redevelopment projects completed or underway on Glencoe Avenue and on Redwood Avenue between Maxella Avenue to the south and West Washington Boulevard to the north. Although the existing on-Property building is operated as a fitness center, the future use of the Property is anticipated to reflect the redevelopment trend in the area and include a new building with first floor non-residential use and upper floor residential use. New buildings associated with the anticipated future use of the property are expected to be constructed either slab on grade or with underground parking. This use is similar to the other properties in the Property vicinity and, from a risk perspective, represents a conservative hypothetical future use scenario.

## 5.6 Cleanup Criteria

### 5.6.1 General

The cleanup criteria for the Site were developed in the FS Report [GeoSyntec, 2005a]. The following factors were considered:

- A hypothetical future use scenario which includes a building anywhere on the Property, configured to accommodate first floor non-residential use and upper floor residential use;

- Remedial action objectives; and

- Potential Site health risk.

Cleanup criteria were developed for each of the three COCs identified (PCBs, PCE and TCE). Cleanup criteria either are numeric goals to be achieved through remediation or are non-numeric performance-based criteria. The cleanup criteria were used during the FS process to guide the selection and screening of remedial technologies and the development and detailed analysis of remedial alternatives. A discussion of the development of cleanup criteria follows. Table 5-1 shows the cleanup criteria for the Site, and indicates how each criterion would be met.

### 5.6.2 Soil Cleanup Criteria

#### 5.6.2.1 Chlorinated VOCs

As was summarized in Section 3, chlorinated VOCs in soil largely are limited to the Source Zone. The cleanup of chlorinated VOCs within the Source Zone is discussed below in Section 5.6.3.1. Outside of the Source Zone, a shallow soil cleanup is described below in Section 5.6.2.2. This shallow soil cleanup, which is focused on PCBs, also will remove VOCs that may be present in these soils although the VOCs in these shallow soils are not thought to pose a significant risk to receptors.

The potential for VOCs to impact Site media outside of the Source Zone has been addressed through several stages of the RI. It also was the subject of the May 2005, June 2005, and July 2005 sampling events described in Sections 3.6.2 and 3.6.3, respectively. Currently, outside the Source Zone no VOC contaminant mass was identified that is believed to pose a threat to Site media. Therefore, there is no specific cleanup criterion focused on VOCs outside of the Source Zone.

#### 5.6.2.2 PCBs

The basis for the cleanup criteria for PCBs in shallow soil is presented in a memorandum included in the FS Report, which explains that cleanup of shallow soils to a concentration of 17 mg/kg, and to a maximum depth of ten feet bgs, will allow the risk-based goal of $1 \times 10^{-5}$ cancer risk to be achieved for future hypothetical receptors at the Property (i.e., landscapers and utility/trench workers). A Property-wide average concentration of 6.4 mg/kg results from the cleanup of shallow soils containing PCB concentrations greater than 17 mg/kg.

### 5.6.3 Source Zone Cleanup Criteria

#### 5.6.3.1 Chlorinated VOCs

The basis for the risk-based concentrations for PCE and TCE in soil vapor associated with the Source Zone is presented in the FS Report. Because the current soil vapor concentrations on Site would, if not addressed, likely cause unacceptable exposures to the occupants of a hypothetical mixed-use non-residential/residential building, soil vapor risk-based concentrations were developed for the hypothetical future building assuming that engineered controls (vapor control system) would be required and included in the building construction. With the inclusion of such engineered controls, the analysis in the FS Report shows that there would be no significant risk to occupants of the hypothetical mixed use building. The installation of control systems is typical for mixed-use building construction in the area of the Property, and indeed throughout Southern California.

The cleanup criteria for VOCs in the Source Zone call for application of an in-situ technology in the VOC Source Zone to destroy contaminants to the limit of the technology. The criteria also call for the inclusion of adequate engineered controls to mitigate exposure to chlorinated VOC soil vapor concentrations to risk levels of $<10^{-6}$ for future on-Property residents and $<10^{-5}$ for future landscapers and utility/trench workers. In addition, the noncancer hazard index will be reduced to <1.

The Source Zone and cleanup approach are discussed in Section 6 of this RAP. Based on the results of a soil vapor survey to be performed at the completion of the remedy, post-remedy cumulative risk due to soil vapor will be assessed, and an assessment will then be made regarding how the vapor control system will be maintained. Any such maintenance requirement will be included in an institutional control. Because soil vapors are believed to emanate from the Source Zone, soil vapor concentrations throughout the Site are expected to decline after the remedy is complete.

5.6.3.2 PCBs

Within the Source Zone, a soil column containing high-concentration PCBs will be excavated and removed. There is no specific cleanup criterion developed for PCBs within the soil column, since the soil column excavation is based upon the removal of a specific area containing PCBs.

### 5.6.4 Groundwater Cleanup Criteria

5.6.4.1 Chlorinated VOCs

The cleanup criteria for the groundwater plume are based on the limits of the technology as applied to the Source Zone. As was discussed previously in this RAP, the origin of the groundwater contamination is DNAPL within the Source Zone. The cleanup of the Source Zone, described above, will destroy and/or significantly reduce DNAPL within this Source Zone. Groundwater contaminant concentrations are expected to decline once the remediation is complete. The cleanup criteria, therefore, call for continued monitoring of the dissolved groundwater plume to demonstrate acceptable future risk to off-Property receptors: risk levels of $<10^{-6}$ for future off-Property residents, and risk levels of $<10^{-5}$ for future landscapers and utility/trench workers; noncancer hazard index of <1; and achievement of ecological risk standards downgradient of the Property. In addition, the cleanup criteria require that the deep aquifer, which has shown no evidence of impact from Property contaminants, continue to be protected.

Ultimately, the goal of the groundwater cleanup will be to reach MCLs in groundwater. That goal may be achievable over an indefinite time, through the continued action of natural attenuation mechanisms.

#### 5.6.4.2 PCBs

PCBs are not a groundwater COC and have not been detected in groundwater wells downgradient of the Property. There is no cleanup criterion required nor developed for PCBs in groundwater.

# 6. SUMMARY OF FEASIBILITY STUDY AND EVALUATION OF ALTERNATIVES

## 6.1 Summary of FS Process

Three remedial alternatives were analyzed in detail in the FS Report. [GeoSyntec, 2005a]. These were:

- Alternative 1: No Action
- Alternative 2: Selective Excavation and Electrical Resistive Heating
- Alternative 3: Selective Excavation and In-Situ Chemical Oxidation

A conceptual design of each of these alternative was developed during the FS process, which accommodates the hypothetical future use scenario described in Section 5.5; this scenario includes a building anywhere on the Property, configured to accommodate first floor commercial / non-residential use and upper floor residential use. These remedial alternatives are briefly described below and include the common elements of institutional controls, such as deed restrictions, engineered controls, such as vapor control systems, and groundwater monitoring. These common elements are discussed in further detail in Section 7 of this RAP.

### 6.1.1 Alternative 1: No Action

The no action alternative consists of no remedial action, institutional controls or engineered controls to address soil, Source Zone, and groundwater exceeding the cleanup criteria for the Site. If applied, the Source Zone would not be remediated, groundwater would not be monitored, and a contingency plan would not be in place. Alternative 1, No Action, was included as required by USEPA guidance.

### 6.1.2 Alternative 2: Selective Excavation and Electrical Resistive Heating

Alternative 2, Selective Excavation and Electrical Resistive Heating, consists of a combination of shallow soil excavation and deeper soil column excavation to meet the soil cleanup criteria for the Property as well as electrical resistive heating to focus on Source Zone / groundwater remediation.

Shallow soil excavation would be employed to remove PCBs in these soils, thereby eliminating the potential for incidental ingestion and dermal contact of on-Property shallow soils. The shallow soil excavation would remove, based upon existing data, PCBs greater than 17 mg/kg in the top ten feet, resulting in a Property-wide residual average of 6.4 mg/kg (acceptable commercial worker exposure). Confirmation of the appropriate area of soil removal would be performed, either prior to the excavation or after the excavation. This concentration threshold for PCBs is based upon the DTSC-approved RA showing no unacceptable risk from PCBs at a Property-wide average of 6.4 mg/kg. Areas of PCB soil concentrations greater than 17 mg/kg are shown in Figure 6-1. Removal of this volume of soil would remove over 95 percent of the PCBs identified in soils in the top ten feet of the Property. The total volume of shallow soils to be excavated under this scenario is approximately 900 cubic yards (CY).

The soil column excavation would remove soils impacted with high concentrations of PCBs within a defined area in the Source Zone. A 20-foot diameter footprint was determined to encompass these high-concentration PCB-impacted soils (see Figure 6-2). A cross-section illustrating borings lying within this 20-foot diameter footprint that delineate high PCB concentrations, laterally and vertically, is shown in Figure 6-3. Removal of this soil column would remove over 92 percent of the PCB mass within the Source Zone.

Electrical resistive heating would be focused on mass removal of PCE and TCE in the Source Zone, which includes vadose zone and saturated zone VOCs. The anticipated remediation area, approximately 30 feet in diameter, is shown in Figure 6-4. Electrical resistive heating would be applied from the ground surface to a depth of approximately 50 feet bgs (total depth of detected VOCs).

### 6.1.3 Alternative 3: Selective Excavation and In-Situ Chemical Oxidation

Alternative 3, Selective Excavation and In-Situ Chemical Oxidation, consists of a combination of shallow soil excavation and deeper soil column excavation activities to meet the soil cleanup criteria for the Property as well as in-situ chemical oxidation to focus on Source Zone / groundwater remediation.

Shallow soil excavation would be employed to remove PCBs in these soils, thereby eliminating the associated potential for incidental ingestion and dermal contact of on-Property shallow soils. The shallow soil excavation would remove PCBs greater than 17 mg/kg in the top ten feet, resulting in a residual Property-wide average of 6.4 mg/kg (acceptable commercial worker exposure). Confirmation of the appropriate area of soil removal would be performed, either prior to the excavation or after the excavation. This concentration threshold for PCBs is based upon the DTSC-approved RA showing no unacceptable risk from PCBs at a Property-wide average of 6.4 mg/kg. Areas of PCB soil concentrations greater than 17 mg/kg are shown in Figure 6-1. A cross-section illustrating borings lying within this 20-foot diameter footprint that delineates high PCB concentrations, laterally and vertically, is shown in Figure 6-3. Removal of this volume of soil would remove over 95 percent of the PCBs identified in the top ten feet of soils at the Property. The total volume of shallow soils to be excavated under this scenario is approximately 900 cubic yards (CY).

The soil column excavation would consist of removing soils impacted with high concentrations of PCBs within a defined area in the Source Zone. A 20-foot diameter footprint was determined to encompass these high-concentration PCB-impacted soils (see Figure 6-2). Removal of this soil column would eliminate over 92 percent of the PCB mass within the Source Zone.

In-situ chemical oxidation would deliver chemical oxidants to the saturated zone to destroy DNAPL in the Source Zone. A batch solution of potassium permanganate would be injected into wells screened throughout the saturated zone (from 20 feet bgs to 50 feet bgs). The solution would then infiltrate into the surrounding saturated medium, oxidizing VOCs contained in groundwater. The potassium permanganate would be allowed to react in the aquifer before low-flow sampling would occur. COCs and degradation products would then be monitored to determine technology effectiveness. The technology would not be effective in removing VOCs from vadose zone soils within the Source Zone.

## 6.2 <u>Evaluation Criteria</u>

The FS process involves evaluating each remedial alternative with respect to nine criteria specified by the Health and Safety Code section 25356.1(d), which requires that RAPs be based on the National Contingency Plan (NCP). The NCP identifies the nine criteria, or standards, upon which to evaluate alternatives for cleaning up of a hazardous substance release site. The nine criteria, as modified for the State of California, are summarized below:

### 6.2.1 Overall Protection of Human Health and the Environment

This criterion addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineered controls, or institutional controls.

### 6.2.2 Compliance with State and Federal Requirements

This criterion addresses whether or not a remedy will meet all appropriate federal, state, and local environmental laws and regulations.

### 6.2.3 Long-Term Effectiveness and Permanence

This criterion refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

### 6.2.4 Reduction of Toxicity, Mobility and Volume (TMV) through Treatment

This criterion refers to the ability of a remedy to reduce the toxicity, mobility, and volume of the hazardous substances or constituents present at the site.

### 6.2.5 Cost: 30 – Year Present Worth

This criterion evaluates the estimated capital and O&M costs of each alternative.

### 6.2.6 Short-Term Effectiveness

This criterion addresses the period of time needed to complete the remedy, and any adverse impact on human health and the environment that may be posed during the construction and implementation period, until the cleanup standards are achieved.

### 6.2.7 Implementability

This criterion refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

### 6.2.8 Regulatory Agency Acceptance

This criterion indicates whether, based on a review of the information, the applicable regulatory agencies would agree with the preferred alternative.

### 6.2.9 Community Acceptance

This criterion indicates whether community concerns are addressed by the remedy, and whether or not the community has a preference for a remedy.

In order for an alternative to be eligible for selection, it must meet the first two criteria described above, called "threshold criteria." Criteria 3 through 7 are the "primary balancing criteria," and criteria 8 and 9 are "modifying criteria." The NCP at 40 CFR 300.430(e) presents a discussion on the use of these criteria.

The remainder of this section briefly describes the remedy alternatives and the FS results. The nine-criteria evaluation is summarized in Table 6-1.

## 6.3 Comparative Analysis

In this section, the final remedial alternatives are compared by using the detailed analysis criteria. The purpose of this comparative analysis is to identify the relative advantages and disadvantages of each final remedial alternative and to provide a basis for identifying the preferred remedial alternative. In Table 6-2, each final remedial alternative is assigned a ranking for each detailed analysis criterion. These rankings range from "low" to "high" and are accompanied with a numeric ranking from 1 to 5. A numeric ranking of "1" is lowest, or worst; "5" is highest, or best. With respect to cost, "1" is most expensive; "5" is least expensive. At the conclusion of the comparative analysis, the preferred remedial alternative is identified.

### 6.3.1 Overall Protection of Human Health and the Environment

Alternative 1, No Action, does not provide adequate protection of human health and the environment. No further assessment of, or comparison with, this alternative is provided. Alternative 2 would perform better than Alternative 3 with respect to overall protection of human health and the environment because of the greater degree of DNAPL and VOC mass that would be destroyed through the use of electrical resistive heating as opposed to in-situ chemical oxidation. Alternative 2 would meet the threshold requirement of protectiveness more easily than would Alternative 3. Specific comparative points follow.

- With the exception of Alternative 1, No Action, the two remaining alternatives meet the threshold requirement of providing overall long-term protection of human health and the environment, although Alternative 2 would meet the requirement more readily than would Alternative 3.

- Alternative 2, Selective Excavation and Electrical Resistive Heating, would provide long-term protection by removing soils containing high concentrations of PCBs, in turn mitigating the associated risk via ingestion and direct contact of these soils. Alternative 2 also would provide protection by effectively reducing DNAPL and VOC contamination both in the unsaturated and saturated portions of the Source Zone through electrical resistive heating, which in turn would mitigate potential indoor air risk from soil vapor as well as manage the dissolved phase plume. Institutional controls and engineered controls would provide added protection.

- Alternative 3, Selective Excavation and In-Situ Chemical Oxidation, would provide long-term protection by removing soils containing high concentrations of PCBs, in turn mitigating the associated risk via ingestion and direct contact of these soils. Alternative 3 also would provide protection by reducing the mass of DNAPL and VOCs within the saturated portion of the Source Zone through in-situ chemical oxidation, which in turn would mitigate potential risk to indoor air exposure as well as manage the dissolved phase plume. Alternative 3 likely would not remove as much DNAPL mass as Alternative 2 within the Source Zone, however, and would not remove appreciable DNAPL or VOC mass in the unsaturated portion of the Source Zone. Institutional controls and engineered controls would provide added protectiveness.

### 6.3.2 Compliance With ARARs

Alternatives 2 and 3 would perform equally well with respect to compliance with ARARs. Each of these two alternatives would meet the threshold requirement of ARAR compliance.

### 6.3.3 Long-Term Effectiveness and Permanence

Alternative 2, Selective Excavation and Electrical Resistive Heating, is ranked higher than Alternative 3, Selective Excavation and In-Situ Chemical Oxidation, with respect to long-term effectiveness and permanence. Each alternative would provide a long-term, permanent solution that would be protective of human health and the environment. However, electrical resistive heating has been shown to be more effective in eliminating DNAPL sources as it acts in both the vadose and the saturated zones; whereas, in-situ chemical oxidation is effective primarily in the saturated zone only. Moreover, even within the saturated portion of the Source Zone, electrical resistive heating likely would remove more contaminant mass than would in-situ chemical oxidation because it attacks DNAPL directly, rather than being limited by the requirement of initial dissolution of the DNAPL into the more dilute soluble phase prior to chemical oxidation; and because it is more effective in addressing contamination in finer-grained soils, which exhibit low permeability and are thus difficult to infuse with permanganate.

Alternative 2, therefore, is rated “High” with a numeric ranking of 5, and Alternative 3 is rated “Moderate” with a numeric ranking of 3. For the foreseeable future, institutional controls and engineered controls (vapor control systems) will provide risk mitigation from vapors emanating from the Source Zone / groundwater. Specific comparative points follow:

- Alternatives 2 and 3 each provide a long-term, permanent solution that is protective of human health and the environment. Alternative 2, however, removes more contaminant mass in the unsaturated soils and in the saturated zone and therefore provides for a higher degree of confidence in the permanence of the remedy.

- Alternatives 2 and 3 each remove PCB-impacted soil, mitigating the risk from ingestion and/or direct contact.

- Alternatives 2 and 3 each provide for long-term protection of receptors in a future building on the Property because of the inclusion of vapor control systems.

### 6.3.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternatives 2 and 3 each will reduce toxicity, mobility, and volume through in-situ treatment of the Source Zone. Electrical resistive heating (as part of Alternative 2) will provide more Source Zone mass reduction than in-situ chemical oxidation (part of Alternative 3), as discussed above, Alternative 2, Selective Excavation and Electrical Resistive Heating is, therefore, rated “High” with a numeric ranking of 5. Alternative 3, Selective Excavation and In-Situ Chemical Oxidation is rated “Moderate” with a numeric ranking of 3.

### 6.3.5 Short-term Effectiveness

Alternatives 2 and 3 would perform equally well with respect to short-term effectiveness and present few short-term effectiveness issues. Both alternatives are rated “High” for this category and assigned a numeric rating of 5. Specific comparative points follow:

- Each alternative would be constructed in a matter of weeks after construction begins;

- Electrical resistive heating would provide treatment relatively quickly in the Source Zone, whereas in-situ chemical oxidation would take somewhat longer; and

- Under Alternative 3, during the period of injection there would be periodic deliveries of chemical oxidant (permanganate) solution to recharge the trench. Since permanganate is a reactive chemical, the periodic delivery would require maintaining a small exclusionary zone for a short period of time, estimated at one day or less per event.

### 6.3.6 Implementability

Neither of the alternatives would pose significant implementation issues. Each is rated “High” and receives a numeric ranking of 5 for implementability. Specific comparative points follow.

- Each alternative would be implemented in a matter of weeks after all administrative actions and work plans are completed;

- The electrical resistive heating system can be completely installed in the subsurface (i.e., installation and operation would not disturb current activities at or near the Property); and

- Contractors, materials, and services are commonly used and available for each of Alternatives 2 and 3.

### 6.3.7 Cost

Alternatives 2 and 3 are similar in cost, with Alternative 2 costing more than Alternative 3. The estimated cost of Alternative 2 (Total cost with non-discounted O&M) is $1,783,000; and the estimated cost of Alternative 3 (Total cost with non-discounted O&M) is $1,680,000. Detailed costs for Alternatives 2 and 3 can be found in Tables 6-3 and 6-4, respectively.

### 6.3.8 State Acceptance

DTSC has reviewed the project documentation and has recommended implementation of Alternative 2.

### 6.3.9 Community Acceptance

The community had the opportunity to comment on the Draft RAP through a 60-day public comment period and at the 25 October 2005 public meeting. DTSC received several comments and prepared a Responsiveness Summary to address each comment. The Responsiveness Summary is included as Appendix E to this RAP.

# 7. THE SELECTED REMEDY

## 7.1 General

Based on the comparative analysis of the remedial alternatives, the combined soil and Source Zone / groundwater remedial alternative that meets the RAOs and ranks the highest is Alternative 2, Selective Excavation and Electrical Resistive Heating. This is the selected remedy for the Site. The elements of Alternative 2 are:

- Construction and operation of an electrical resistive heating array approximately 30 feet in diameter within the Source Zone (from ground surface to 50 feet bgs, including both the vadose and saturated zones)for mass removal of PCE and TCE and reduction of VOC concentrations in the dissolved phase plume;

- Shallow excavation of approximately 900 cy of soil to remove PCBs greater than 17 mg/kg in the top ten feet, resulting in a residual Property-wide average of 6.4 mg/kg (acceptable commercial worker exposure). Confirmation of the appropriate area of soil removal would be performed, either prior to the excavation or after the excavation;

- A deeper soil column excavation that would consist of removing approximately 340 cy of soils impacted with high concentrations of PCBs within the Source Zone. The excavation would occur at a depth of 10 feet bgs to 20 feet bgs, since the top ten feet of soil within this soil column will have already been removed due to the shallow soil excavation step described above;

- Conducting a post-remedy soil vapor baseline survey for assessment of the decline in soil vapor concentrations throughout the Property;

- Institutional controls that would prohibit sensitive land uses, would permit mixed-use redevelopment consisting of first floor commercial / non-residential use and upper floor residential use, and would prohibit on-Property groundwater extraction;

- Engineered controls that would consist of an underlying vapor control system comprising a geocomposite vapor barrier under the concrete slab, an air inlet, and vapor monitoring points;
- Groundwater monitoring to evaluate the effectiveness of remediation over time and manage the dissolved phase plume; and
- A formal review of remediation effectiveness after five years.

This remedial alternative effectively mitigates the risk from ingestion, inhalation, and dermal contact with on-Property soils for future non-residential and residential occupants of buildings on Property, and future landscapers and utility/trench workers. Electrical resistive heating in the Source Zone effectively treats the primary source of contamination on the Property, thereby mitigating potential indoor air exposures. Electrical resistive heating achieves direct mass removal of PCE and TCE in DNAPL phase as well as reducing VOC concentrations in the dissolved phase plume. Electrical resistive heating is the best technology available for the Property, as it is proven to achieve mass removal by directly attacking the PCE and TCE in the DNAPL phase as well as reducing VOC concentrations in the dissolved phase plume, and by effectively removing contamination in finer-grained soils.

Based on the Property-specific data within the Source Zone and groundwater, if electrical resistive heating cannot achieve RAOs, no other technology reviewed can do so. In addition, the record to date for the use of electrical resistive heating at DNAPL sites contains no reported failures in reaching endpoints. Institutional and engineered controls also would prevent and mitigate the potential indoor air inhalation of any residual soil vapor of concern at the Property. Groundwater monitoring will manage the dissolved phase plume and raise awareness of any possible increase in VOC concentrations.

Potential PCB exposures to future landscapers and utility/trench workers are mitigated through the use of excavation of shallow soils. Additional mass removal of

PCBs is achieved through the removal of high-concentrations of PCBs in the soil column within the Source Zone.

Alternative 2 readily meets the criteria of overall protection of human health and the environment and satisfying ARARs. When evaluated against the balancing criteria, Alternative 2 provides short-term effectiveness as well as long-term effectiveness and permanence. It also reduces the toxicity, mobility, and volume of COCs in soil and in groundwater. It is readily implementable and presents an effective balance of cost against the other criteria. Alternative 2 also will do the best job of accommodating future redevelopment of the Property

## 7.2 Implementation of the Remedial Alternative

The selected remedial alternative, Selective Excavation and Electrical Resistive Heating, includes excavation of impacted soils and removal of VOCs and DNAPL mass. This alternative (No. 2) consists of a combination of shallow soil excavation and soil column excavation activities to meet the soil cleanup criteria for the Property combined with electrical resistive heating to focus on Source Zone / groundwater remediation. The selective excavation aspect of this alternative is discussed below, with a subsequent discussion regarding application of electrical resistive heating in the Source Zone.

The selective excavation scenarios include the following activities:

- Clear and grub the Property of remaining vegetation and debris;
- Excavate soils that contain constituents at concentrations that exceed cleanup criteria;
- Transport soils containing constituents above cleanup criteria off Property to an approved landfill for disposal;
- Import soils for backfill of the excavation;

- Compact and grade Property to desired finish grade (assumed to be present grade);

- Repave the Property and the timing and sequence of post-excavation activities would be coordinated with redevelopment of the Site; and

- Implement the common remedial elements described.

The excavation scenarios in this alternative call for the off-Property disposal of the excavated PCB-containing soils and the backfill of the excavations with clean, imported soils. A storm water management plan would be prepared and implemented, if necessary. It is also anticipated that transportation plans would be developed for the off-Property disposal of impacted soils.

### 7.2.1 Shallow Soil Excavation

Shallow soil excavation would be employed to remove PCBs in shallow soils, thereby mitigating the associated potential for incidental ingestion of and dermal contact. The shallow soil excavation would remove PCBs greater than 17 mg/kg in the top ten feet of soil, resulting in a Property-wide residual average of 6.4 mg/kg (acceptable commercial worker exposure). Confirmation of the appropriate area of soil removal would be performed, either prior to the excavation or after the excavation. This concentration threshold for PCBs is based upon the DTSC-approved RA showing no unacceptable risk from PCBs at a Property-wide average of 6.4 mg/kg. Areas of PCB soil concentrations greater than 17 mg/kg are shown in Figure 6-1. Removal of this volume of soil would eliminate over 95 percent of the PCBs identified in the top ten feet of soils at the Property.

The total volume of shallow soils to be excavated under this scenario is approximately 900 cubic yards (CY). The area, depth and total volume of soils to be excavated was assessed based on the existing soil data set, which was compiled from the previous RI investigation [URS, 2004b]. Excavated soils would be placed in soil stockpiles pending classification and transport for disposal at an appropriate disposal facility. The Property would then be backfilled with clean fill soil to current grade and the existing pavement would be matched. In addition, the potential for inhalation of indoor air vapors from VOCs in the excavated on-Property shallow soils would also be eliminated.

### 7.2.2 Soil Column Excavation

The soil column excavation would consist of removing soils impacted with high concentrations of PCBs within a defined area in the Source Zone. After assessing the existing soils data set compiled from the previous RI investigation, a 20-foot diameter footprint was determined to encompass these high-concentration PCB-impacted soils (Figure 6-2). The soil within this 20-foot diameter footprint would be excavated below ten feet bgs and above groundwater (20 ft bgs), via auger excavation. It is estimated that the volume of soil removed by the soil column excavation will effectively remove over 92 percent of the PCB mass within the Source Zone. The 20-foot diameter footprint lies within the Source Zone. A plan view and cross-section depicting how the soil column excavation and treatment of the Source Zone coincide are shown in Figures 7-1 and 7-2, respectively.

The total volume of PCB-contaminated soils to be excavated under this scenario is approximately 340 cubic yards (CY). This volume is based on a depth of 10 feet bgs to 20 feet bgs, since the top ten feet of soil will have already been removed due to the shallow soil excavation step described in Section 7.2.1. The area and total volume of soils to be excavated are pre-determined based on the existing soil data set, which was compiled from the previous RI investigation [URS, 2004b]. Excavated soils would be placed in soil stockpiles pending classification and transport for disposal at an appropriate disposal facility. The Property would then be backfilled with clean fill soil to current grade, and the existing pavement would be matched.

### 7.2.3 Electrical Resistive Heating

Electrical resistive heating is an in-situ remedial technology that has been proven successful at eliminating VOC contaminants, including DNAPL, from the subsurface. Through electrical resistive heating, an electrical current is applied to the subsurface through electrodes to enhance the recovery of VOCs and SVOCs from contaminated soils. This process is especially effective at sites, such as this Property, where low-permeability clay soils limit the effectiveness of other technologies. Electrical resistive heating directly targets these finer-grained soils. It is particularly effective where rapid remediation is desired and is particularly applicable to the Property given the redevelopment issues associated with soil vapor. Details of the technology are presented below.

Electrical resistive heating has been proven effective in both vadose and saturated zones and would be focused on PCE and TCE mass removal in the Source Zone. The anticipated remediation area is approximately 30 feet in diameter and is shown in Figure 7-1. Electrical resistive heating would be applied from the ground surface to a depth of approximately 50 feet bgs (total depth of detected VOCs, including both the vadose and saturated zones).

Electrical resistive heating would be applied via an array of electrodes emplaced within the Source Zone. Electrical potential would be applied to this array, generating a voltage gradient throughout the Source Zone. The electrical current generated would preferentially travel through the low-permeability clay soils, as the higher water content and ionic potential of the clay soils provide a more favorable current path than sand or silt soils. As the electrical current generated by the voltage gradient passes through the soil, the resistance of the soil to the current flow causes the soil temperature to rise, thereby increasing the volatility of the contaminant VOCs. As the soils are heated to the boiling point of water, the water turns to steam, stripping the VOCs from the soil pore spaces. Electrical resistive heating utilizes soil vapor extraction to collect the vapor-phase VOCs and steam. The steam then passes through a condenser, knockout box, and granular activated carbon (GAC) to treat the off gas and condensate. A general schematic of one type of the electrical resistive heating process in plan view and cross section can be seen in Figures 7-3 and 7-4, respectively.

Prior to electrical resistive heating implementation, sentinel wells would be installed downgradient of the Source Zone (i.e., beyond the hydraulic influence of the electrical resistive heating system). The sentinel wells would be screened within coarse-grained soils in which DNAPL can migrate more easily and can result in higher dissolution rates than would be expected in fine-grained soils. Soil vapor concentrations would be assessed during remediation to monitor the progress of the technology and to assess the degree of contaminant mass removal. Electrical resistive heating operates to the limit of the technology, until soil vapor concentrations are asymptotic (or ND) or until the operating period anticipated during the design of the system is attained. Electrical resistive heating is anticipated to operate at the Property for up to six months, based on preliminary data evaluation.

Confirmation sampling would be conducted in the sentinel wells periodically, during and after electrical resistive heating. Further operation of the electrical resistive heating system would be dependant on results of confirmation sampling and evaluation of system operation. The residual soil vapor concentrations would be assessed after operation is complete as part of the post-remedy soil vapor baseline survey, described below in Section 7.2.4. In the unlikely event that a significant amount of PCE or TCE migrates from the electrical resistive heating treatment area in dissolved phase during or immediately following the electrical resistive heating treatment, a contingency plan would be implemented that would include injection of chemical oxidant (permanganate) into wells within or downgradient of the zone of treatment to reduce and manage concentrations.

### 7.2.4 Post-Remedy Soil Vapor Baseline Survey

After the remedy is complete, there should be an observable declining trend in Property-wide soil vapor concentrations, given that the Source Zone is believed to be the source of the soil vapor. A soil vapor survey would be conducted after the Source Zone remedy is complete to provide a baseline for the subsequent assessment of the decline in residual soil vapor concentrations throughout the Property. The need for additional sampling events would depend upon the results of the soil vapor baseline survey. To conduct the survey, a sampling plan would be developed that would include sampling at multiple depths in the vadose zone. The sampling plan would include an assessment of the time to reach soil vapor equilibrium throughout the Property after the remedy is complete.

The results of the soil vapor baseline survey also will be used to assess the need for institutional controls due to soil vapor. Any required control measures (i.e., vapor control systems) would be defined in a risk management plan developed to accompany the sampling plan. The risk management plan would be consistent with DTSC guidance and would address controls required until VOCs decline to levels which would not require use of the vapor control system.

### 7.2.5 Institutional Controls

The anticipated institutional controls for the Property would prohibit sensitive land uses (i.e., single family residence, hospitals, schools, or child-care centers), specify new building construction (i.e., first floor non-residential, upper floor residential, and inclusion of vapor control system), and prohibit on-Property groundwater extraction for municipal (i.e., drinking water purposes), industrial, and agricultural (i.e., irrigation) use.

### 7.2.6 Engineered Controls

Based on the Property risk assessment, there is no unacceptable risk for the current on-Property commercial use at the fitness center. However, potential unacceptable risk has been calculated for two hypothetical future on-Property receptors: on-Property residents (risk $>1 \times 10^{-6}$) and on-Property commercial workers (risk $>1 \times 10^{-5}$). Engineered controls such as vapor control systems, in conjunction with the ERH remedy, would mitigate this potential risk. Future Property construction is likely to be slab on grade construction or first floor parking and would include an underlying vapor control system comprising a geocomposite vapor barrier under the concrete slab, an air inlet, a vapor outlet, and vapor monitoring points consistent with current building practice. The vapor control system would be a part of any future construction, whether or not vapor controls were required. A typical vapor control system is shown in Figure 7-5. The use of engineered controls with selective excavation would accommodate the cleanup criteria for soil vapor.

### 7.2.7 Groundwater Monitoring

Groundwater monitoring for PCE and TCE currently is conducted at the Site and would continue on-Property and downgradient of the Property in wells designed to monitor the stability of the plume. This monitoring would be conducted for a period of five years, until the five-year remedy review, or until the dissolved concentrations have shown an acceptable downward trend, as is expected post-remedy, whichever occurs first. The need for any further groundwater monitoring would be assessed and determined as part of the five-year review. After the ERH remedy is complete, a portion of the groundwater plume downgradient of the Source Zone may be affected within one year by changes in groundwater quality due to implementation of the ERH remedy. Groundwater monitoring wells within this area of the plume will be monitored for one year to assess this change in groundwater quality.

The details of groundwater monitoring (i.e., number and location of wells, frequency of monitoring, etc.) will be determined during development of an Operation & Maintenance Plan.

The downgradient off-Property potential risk to receptors overlying the plume currently is insignificant. Following Source Zone remediation through the application of ERH, a declining trend is expected in downgradient groundwater VOC concentrations, resulting in even lower risk on Property and off Property. In the unlikely event that an increasing trend in groundwater VOC concentrations is observed over multiple monitoring events, that condition would be addressed through implementation of the contingency plan identified in Section 7.2.3: chemical oxidant (permanganate) would be injected into wells within or downgradient of the zone of treatment to reduce and manage concentrations. Further, if the footprint of the contaminant plume shifts, a contingency plan would be developed to assess off-Property risk and plume migration.

USEPA guidance in *Performance Monitoring of MNA Remedies for VOCs in Groundwater* [USEPA, 2004] establishes the criteria for groundwater monitoring. Monitoring results will be compared with baseline concentrations. In addition to comparing measured values (i.e., sampling data versus baseline data), statistical procedures also would be used to evaluate the variability associated with the data and to use estimates of variability to guide decision-making processes [USEPA, 2004]. Statistical methods are also available to facilitate analysis and comparison of trends by considering data variability through time [USEPA, 2004].

# 8. FUTURE ACTIVITIES

A Remedial Design document that describes in detail the technical and operational plans for implementation of the RAP will be submitted to the DTSC for review and approval. Remedy implementation will begin following final approval and permitting of the remedy described in this RAP.

**REFERENCES**

California Department of Water Resources, 1961. Planned Utilization of the Ground Water Basins of Los Angeles County, Appendix A – Ground Water Geology. June.

Department of Toxic Substances Control, 2004. Risk Assessment Approval Letter, Rita Kamat to Mark D. Schultheis. May 26.

GeoSyntec, 2004. Risk Assessment, 4144 Glencoe Avenue Site, Los Angeles, California, 23 April 2004.

GeoSyntec, 2005a. Feasibility Study Report, 4144 Glencoe Avenue Site, Los Angeles, California, August, 2005.

GeoSyntec, 2005b. Supplemental Feasibility Study Report, 4144 Glencoe Avenue Site, Los Angeles, California, August, 2005.

Interstate Technology Regulatory Cooperation (ITRC), 2001. Technical regulatory guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater, June 2001.

Poland, J.F., A.A. Garrett and A. Sinnott, 1959. Geology, Hydrology and Chemical Character of Ground Waters in the Torrance-Santa Monica Area, California, U.S. Geological Survey Water Supply Paper 1461.

SiREM Laboratories, 2004. "Laboratory Measurement of Natural Oxidant Demand of Soil, Cornell Dubilier Site, Venice, California, 14 November 2004.

URS Corporation (URS), 2004a, Groundwater Remedial Investigation Report, 4144 Glencoe Avenue, Los Angeles, California.

URS Corporation (URS), 2004b, Revised Soil Remedial Investigation Report, 4144 Glencoe Avenue, Los Angeles, California.

URS Corporation (URS), 2004c, Supplemental Remedial Investigation Report, 4144 Glencoe Avenue, Los Angeles, California, letter dated 23 April 2004

United States Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under the Comprehensive Environmental Response Compensation and Liability Act.

United States Environmental Protection Agency (USEPA), 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater.

United States Environmental Protection Agency (USEPA), 1999. Use of Monitored Natural Attenuation at Superfund RCRA Corrective Action and Underground Storage Tank Sites.

United States Environmental Protection Agency (USEPA), 2003. The DNAPL Remediation Challenge: Is There A Case For Source Depletion? August.

United States Environmental Protection Agency (USEPA), 2004. Performance Monitoring of MNA Remedies for VOCs in Groundwater.

University of California, Riverside, 1996. Background Concentrations of Trace Major Elements in California Soils. Kearney Foundation of Soil Science. March.

# TABLES

**TABLE 5-1**

**CLEANUP CRITERIA**
**4144 GLENCOE AVENUE PROPERTY**
**LOS ANGELES, CALIFORNIA**

| Medium | Cleanup Criteria | |
|---|---|---|
| | Chlorinated VOCs (PCE and TCE) | PCBs |
| Soil | Source zone cleanup criteria (below) govern the soil cleanup. | Remove concentrations exceeding 17 mg/kg to a maximum depth of ten feet bgs. Perform confirmation sampling on excavation sidewalls. |
| Source Zone | Apply in-situ technology in VOC source zone to destroy contaminants to the limit of the technology. Perform confirmation sampling after completion of in-situ treatment.<br><br>Provide adequate engineered controls to mitigate exposure to chlorinated VOC soil vapor concentrations to risk levels of $<10^{-6}$ for future on-site residents, and $<10^{-5}$ for future landscapers and utility workers. Mitigate risk so that the noncancer hazard index is <1 (see Exhibit 2). | Remove soil column to 20 feet below ground surface containing high-concentration PCBs within footprint of VOC source zone. |
| Groundwater | Manage the dissolved plume to demonstrate acceptable future risk to off-site receptors: risk levels of $<10^{-6}$ for future off-site residents, $<10^{-5}$ for future landscapers and utility workers; noncancer hazard index of <1; continue meeting ecological risk standards downgradient of the Site. The remedial goal is to meet Maximum Contaminant Levels (MCLs) in groundwater.<br><br>Protect deep aquifer. | Not a groundwater COC. |

# TABLE 6-1

## FINAL REMEDIAL ALTERNATIVE DETAILED ANALYSIS
## 4144 GLENCOE AVENUE
## LOS ANGELES, CALIFORNIA

| Evaluation Criterion | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| | **No Action** | **Selective Excavation and Electrical Resistive Heating** | **Selective Excavation and In-Situ Chemical Oxidation** |
| **Overall Protection of Human Health and the Environment** | • Would not mitigate potential impacts associated with inhalation, ingestion, direct contact, or indoor air vapor migration exposures.<br>• No further analysis performed. | • Would mitigate primary human health exposure pathways.<br>• Would mitigate the potential risk from soil vapors by destroying the mass of DNAPL and VOCs in the entire source zone and in groundwater.<br>• Includes institutional and engineered controls as well as groundwater monitoring to mitigate residual risks after remediation is complete.<br>• Institutional controls would prohibit sensitive land use, accommodate mixed-use redevelopment (first floor non-residential, upper floor residential), and prohibit on-site groundwater extraction.<br>• Continued O&M of building vapor control systems would provide for overall protection of human health.<br>• Groundwater monitoring would ensure plume stability and create awareness of any increase in VOC concentrations. | • Would mitigate primary human health exposure pathways.<br>• Would leave some VOCs in unsaturated soils and would not address all of the DNAPL and VOCs in the source zone and in groundwater.<br>• Includes institutional and engineered controls as well as groundwater monitoring to mitigate residual risks after remediation is complete.<br>• Institutional controls would prohibit sensitive land use, accommodate mixed-use redevelopment (first floor non-residential, upper floor residential), and prohibit on-site groundwater extraction.<br>• Continued O&M of building vapor control systems would provide for overall protection of human health.<br>• Groundwater monitoring would ensure plume stability and create awareness of any increase in VOC concentrations. |
| **Compliance with ARARs** | • N/A | • Would comply with ARARs. | • Would comply with ARARs. |

# TABLE 6-1 (cont.)

## FINAL REMEDIAL ALTERNATIVE DETAILED ANALYSIS
## 4144 GLENCOE AVENUE
## LOS ANGELES, CALIFORNIA

| Evaluation Criterion | Alternative 1<br>No Action | Alternative 2<br>Selective Excavation and Electrical Resistive Heating | Alternative 3<br>Selective Excavation and In-Situ Chemical Oxidation |
|---|---|---|---|
| **Long-Term Effectiveness and Permanence** | • N/A | • Excavation removes PCB-impacted soil, resulting in an effective long-term permanent solution.<br>• Electrical resistive heating would destroy source zone contamination in unsaturated and saturated areas. Would result in a long-term permanent solution.<br>• Institutional controls, O&M of engineering controls, and groundwater monitoring would provide long-term, effective protection of human health. | • Excavation removes PCB-impacted soil, resulting in an effective long-term permanent solution.<br>• In-situ chemical oxidation would reduce most contaminant mass in the saturated zone of the source area, but not in the unsaturated zone. Would be helpful in achieving a long-term permanent solution.<br>• Institutional controls, O&M of engineering controls, and groundwater monitoring would provide long-term, effective protection of human health. |
| **Reduction of Toxicity, Mobility, and Volume Through Treatment** | • N/A | • Would provide for broad reduction of toxicity, volume, and mobility of chemicals through treatment in soil, source zone, and groundwater.<br>• The rate of reduction of toxicity, mobility and volume is rapid with electrical resistive heating. | • Would provide for some reduction of toxicity, volume, and mobility of chemicals through treatment in soil, source zone, and groundwater. Would leave some contaminants in source zone and in groundwater.<br>• The rate of reduction of toxicity, mobility and volume is fairly rapid with in-situ chemical oxidation. |

# TABLE 6-1 (cont.)

## FINAL REMEDIAL ALTERNATIVE DETAILED ANALYSIS
## 4144 GLENCOE AVENUE
## LOS ANGELES, CALIFORNIA

| Evaluation Criterion | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| | **No Action** | **Selective Excavation and Electrical Resistive Heating** | **Selective Excavation and In-Situ Chemical Oxidation** |
| **Short-Term Effectiveness** | • N/A | • Excavation of shallow soils and auger excavation would be accompanied by noise and safety issues. Dust from the moist soils would not be a significant issue, although there may be minor VOC emissions during excavation and well installation.<br>• Electrical resistive heating would pose minor safety issues, readily manageable through prudent health and safety measures. | • Excavation of shallow soils and auger excavation would be accompanied by noise and safety issues. Dust from the moist soils would not be a significant issue, although there may be minor VOC emissions during excavation and well installation.<br>• Would be periodic deliveries of a reactive chemical oxidant (permanganate) to recharge the trench.<br>• Each in-situ chemical oxidation recharge event would require maintaining a small exclusionary zone, for less than a day. |
| **Implementability** | • N/A | • Can be performed with commonly available construction equipment and materials using trained contractors Electrical resistive heating is a reliable, proven, and effective technology for destruction of DNAPL and VOCs. | • Can be performed with commonly available construction equipment and materials using trained contractors.<br>**1.** In-situ chemical oxidation is a reliable, proven, and effective technology for destruction of VOCs in saturated zones, but is ineffective in unsaturated zones. Less effective at treating DNAPL. |

# TABLE 6-1 (cont.)

## FINAL REMEDIAL ALTERNATIVE DETAILED ANALYSIS
## 4144 GLENCOE AVENUE
## LOS ANGELES, CALIFORNIA

| Evaluation Criterion | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| | **No Action** | **Selective Excavation and Electrical Resistive Heating** | **Selective Excavation and In-Situ Chemical Oxidation** |
| **Cost** | • N/A | • Capital cost: $1,733,000<br>• O&M cost (non-discounted): $50,000<br>• Total cost (non-discounted O&M): $1,783,100 | • Capital cost: $1,330,500<br>• O&M cost (non-discounted): $350,000<br>• Total cost (non-discounted O&M): $ 1,680,500 |

# TABLE 6-2

## FINAL REMEDIAL ALTERNATIVES– COMPARATIVE ANALYSIS
## 4144 GLENCOE AVENUE SITE
## LOS ANGELES, CALIFORNIA

| Comparative Analysis Criterion | Alternative 1<br>No Action | Alternative 2<br>Selective Excavation and Electrical Resistive Heating | Alternative 3<br>Selective Excavation and In-Situ Chemical Oxidation |
|---|---|---|---|
| **Overall Protection of Human Health and the Environment** | Does not meet threshold requirement. | Meets threshold requirement. | Meets threshold requirement. |
| **Compliance with ARARs** | Does not meet threshold requirement. | Meets threshold requirement. | Meets threshold requirement. |
| **Long-Term Effectiveness and Permanence** | N/A | High: 5 | Moderate: 3 |
| **Reduction of Toxicity, Mobility, and Volume Through Treatment** | N/A | High: 5 | Moderate: 3 |
| **Short-Term Effectiveness** | N/A | High: 5 | High: 5 |
| **Implementability** | N/A | High: 5 | High: 5 |
| **Cost** | N/A | Moderate: 3 | Moderate: 3 |
| **State Acceptance** | N/A | To be addressed when DTSC makes its final remedial decision and prepares the ROD. | |
| **Community Acceptance** | N/A | To be addressed when DTSC makes its final remedial decision and prepares the ROD. | |
| **OVERALL RANKING** | **Does not meet threshold requirement.** | **High: 23** | **Moderate-to-High: 19** |

Note: a numeric ranking of “1” is lowest, or worst; “5” is highest, or best. With respect to cost, “1” is most expensive; “5” is least expensive.

N/A: Not Applicable.

**TABLE 6-3**
**FINAL REMEDIAL ALTERNATIVE 2 - DETAILED COST SUMMARY**
**4144 GLENCOE AVENUE SITE**
**LOS ANGELES, CALIFORNIA**

| **CAPITAL COSTS** | | | | | |
|---|---|---|---|---|---|
| **ITEM** | **Units** | **Unit ($)** | **Qnty** | **Extended ($)** | **Assumptions** |
| **1. SHALLOW SOIL EXCAVATION (PCB Soil Above 17 PPM):** | | | | | Excavate Site areas with PCBs >17 PPM to 10 ft (570 CY in place). |
| **General Costs** | | | | | |
| Security[1] | Day | $ 108 | 4 | $ 432 | $9/hr, 12 hrs/day (overnight), number of days from excavation duration total. |
| Health & safety - Air Monitoring[2] | Day | $ 1,500 | 2 | $ 3,000 | Assumes 15 days for excavation and backfill of SVE trenches; 10 days for PCB excavation. |
| Materials Handling/Transportation Plan[2] | Ea | $ 15,000 | 1 | $ 15,000 | |
| **Subtotal** | | | | **$ 18,432** | |
| Contractor & Misc. Overhead[3] | | | 10% | $ 1,843 | |
| Permitting[3] | | | 5% | $ 922 | |
| Engineering Design[3] | | | 20% | $ 3,686 | |
| Construction CQA[3] | | | 15% | $ 2,765 | |
| Contingency[3] | | | 20% | $ 3,686 | |
| **Subtotal - General Costs** | | | | **$ 31,334** | |
| **Excavation Costs** | | | | | |
| Mob/Demob[2] | LS | $ 5,000 | 1 | $ 5,000 | |
| Emissions Control[2] | LS | $ 10,000 | 1 | $ 10,000 | |
| Traffic Control[2] | Day | $ 520 | 2 | $ 1,040 | Assumes 65/hr on-Site truck traffic manager, 8 hours per day. |
| On-Site Soil Excavation and Haul[1] | CY | $ 5 | 900 | $ 4,050 | Backhoe excavate & stockpile; 1.4 bulking factor. |
| TSCA/RCRA Facility Transportation and Disposal[5] | Ton | $ 129 | 1,440 | $ 185,760 | 1.6 tons per CY in place; includes $42/ton CA BOE fee. Assumes soil to be disposed contains some residual VOCs. |
| Soil backfill, purchase and deliver[1] | CY | $ 6 | 900 | $ 5,400 | |
| Short haul, backfill[1] | CY | $ 2 | 900 | $ 1,800 | Dozer, 300 ft max. Use imported soils for backfill of the excavation. |
| Compaction[1] | CY | $ 0.75 | 900 | $ 675 | Sheeps foot roller 6 in. lift, 2 pass. Compact and grade to desired finish grade (assumed to be present grade). |
| Water for compaction[1] | Day | $ 10 | 2 | $ 20 | 7,000 gal/day, $1. per 100 CF. |
| Estimated duration[2] | Day | | 2 | | The excavation will be performed 8 hours per day. |
| **Subtotal** | | | | **$ 213,745** | |

**TABLE 6-3**
**FINAL REMEDIAL ALTERNATIVE 2 - DETAILED COST SUMMARY**
**4144 GLENCOE AVENUE SITE**
**LOS ANGELES, CALIFORNIA**

| ITEM | Units | Unit ($) | Qnty | Extended ($) | Assumptions |
|---|---|---|---|---|---|
| Contractor & Misc. Overhead[3] | | | 8% | $ 17,100 | |
| Permitting[3] | | | 5% | $ 10,687 | |
| Engineering Design[3] | | | 15% | $ 32,062 | |
| Construction CQA[3] | | | 10% | $ 21,375 | |
| Contingency[3] | | | 20% | $ 42,749 | |
| **Subtotal - Excavation Costs** | | | | **$ 337,717** | |
| **Subtotal - Shallow Soil Excavation** | | | | **$ 369,052** | |
| **2. AUGER EXCAVATION** | | | | | |
| Auger Excavate and Dispose[2,4] | LS | $324,000 | 1 | **$ 324,000** | Auger excavation of a 20-ft diameter area from 10 ft bgs to 20 ft bgs. (Excludes top 10 ft bgs excavation, which is covered under shallow soil excavation). |
| **Subtotal - Auger Excavate and Dispose** | | | | **$ 324,000** | |
| **3. ELECTRICAL RESISTIVE HEATING** | | | | | |
| Installation and Operation[5] | LS | $500,000 | 1 | **$ 500,000** | |
| **Subtotal - Electrical Resistive Heating** | | | | **$ 500,000** | |
| **4. POST-REMEDY VAPOR SURVEY** | | | | | |
| Post-Remedy Baseline Survey[2] | LS | $ 20,000 | 1 | **$ 20,000** | |
| **Subtotal - Post-Remedy Baseline Survey** | | | | **$ 20,000** | |
| **5. ENGINEERED CONTROLS** | | | | | |
| Sub-Slab Venting System[2] | SF | $ 9.00 | 50,000 | **$ 450,000** | Includes geomembrane barrier and engineered transmissive layer (passive). |
| **Subtotal - Engineered Controls** | | | | **$ 450,000** | |

**TABLE 6-3**
**FINAL REMEDIAL ALTERNATIVE 2 - DETAILED COST SUMMARY**
**4144 GLENCOE AVENUE SITE**
**LOS ANGELES, CALIFORNIA**

| ITEM | Units | Unit ($) | Qnty | Extended ($) | Assumptions |
|---|---|---|---|---|---|
| **6. GROUNDWATER MONITORING** | | | | | |
| Well Installation and Sampling[2] | LS | $15,000 | 1 | **$ 15,000** | |
| **Subtotal - Groundwater Monitoring** | | | | **$ 15,000** | |
| **7. OTHER TASKS** | | | | | |
| Five-Year Review[2] | LS | $ 20,000 | 1 | $ 20,000 | |
| Electrical Resistive Heating Contingency Plan[2] | LS | $ 35,000 | 1 | $ 35,000 | |
| **Subtotal - Other Tasks** | | | | **$ 55,000** | |
| **FINAL REMEDIAL ALTERNATIVE 2 TOTAL CAPITAL COSTS** | | | | | |
| **Capital Costs Subtotal (Other Tasks Included)** | | | | **$ 1,733,052** | |
| **O&M Total 5-Yr Discounted NPV (see Table 7-3a)** | | | | **$ 43,295** | |
| **O&M Total 5-Yr Non-Discounted NPV (see Table 7-3a)** | | | | **$ 50,000** | |
| **TOTAL (NPV with 5-Yr O&M Discounted)** | | | | **$ 1,776,346** | |
| **TOTAL (NPV with 5-Yr O&M Non-Discounted)** | | | | **$ 1,783,052** | |

**Notes**

[1] Cost based on Means guide

[2] Cost based on professional experience

[3] Cost factor based on "A guide to developing and documenting cost estimates during the feasibility study", USEPA, July 2000

[4] Cost based on personal communication with vendor

[5] Cost based on estimate from vendor

**TABLE 6-4**
**FINAL REMEDIAL ALTERNATIVE 3 - DETAILED COST**
**4144 GLENCOE AVENUE SITE**
**LOS ANGELES, CALIFORNIA**

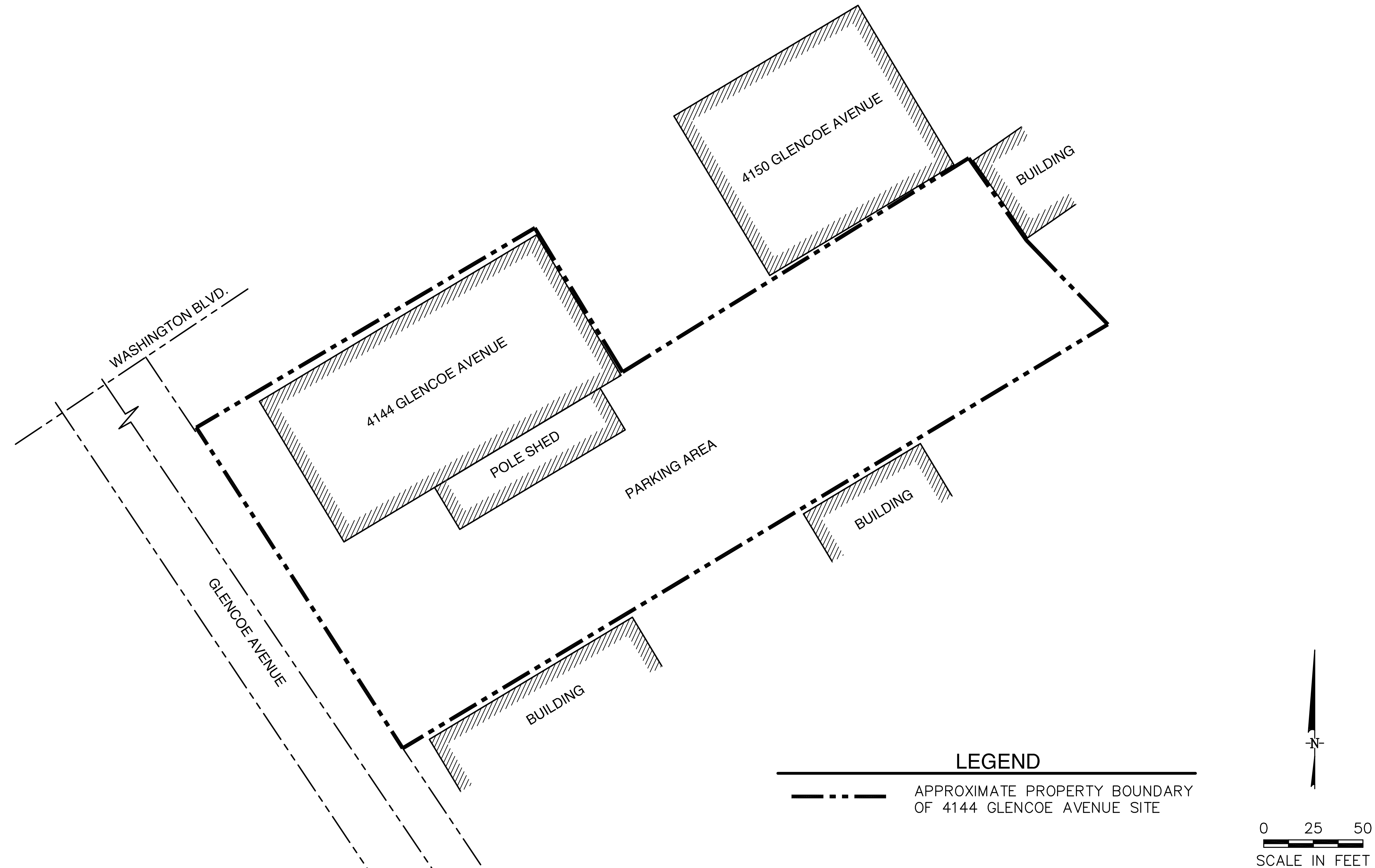
| **OPERATION AND MAINTENANCE COSTS** | | | | | |
|---|---|---|---|---|---|
| **ITEM** | **Units** | **Unit ($)** | **Qnty** | **Extended ($)** | **Assumptions** |
| **2. IN-SITU CHEMICAL OXIDANT INJECTION** | | | | | |
| **Injection of Oxidant** | | | | | |
| Bench Test[5] | Each | $ 10,000 | 1 | $10,000 | |
| Mob/Demob[5] | Day | $ 5,000 | 12 | $60,000 | 3 days per injection event; 4 events |
| Potassium Permanganate Dosing[2] | Each | $ 40,000 | 4 | $160,000 | Cost for chemicals + other injection costs/event; 4 events |
| Treatment System O&M[2] | Yr | $ 25,000 | 1 | $25,000 | Labor & equipment. |
| Treatment System Rehabilitation[2] | Yr | $ 15,000 | 1 | $15,000 | Address precipitate, etc. |
| Reporting[2] | Yr | $ 7,500 | 4 | $30,000 | Assumes quarterly reporting. |
| **Subtotal** | | | | **$300,000** | |
| **Subtotal Annual O&M Cost** | | | | **$300,000** | Operation is for one year only |
| **6. GROUNDWATER MONITORING** | | | | | |
| Well Installation and Sampling[2] | Yr | $10,000 | 1 | **$10,000** | |
| **Subtotal** | | | | **$10,000** | |
| **Subtotal Annual O&M Cost** | | | | **$310,000** | |
| **O&M Subtotal 5-Yr Discounted NPV** | | | | **$43,295** | Discount Rate = 5% |
| **O&M Subtotal 5-Yr Non-Discounted NPV** | | | | **$50,000** | |
| **O&M Total 5-Yr Discounted NPV** | | | | **$343,295** | |
| **O&M Total 5-Yr Non-Discounted NPV** | | | | **$350,000** | |

**Notes**

1 Cost based on Means guide
2 Cost based on professional experience
3 Cost factor based on "A guide to developing and documenting cost estimates during the feasibility study", USEPA, July 2000
4 Cost based on personal communication with vendor
5 Cost based on estimate from vendor

# FIGURES


**FIGURE 2-1**
**PROPERTY LOCATION MAP**
**4144 GLENCOE AVENUE**
**LOS ANGELES, CALIFORNIA**



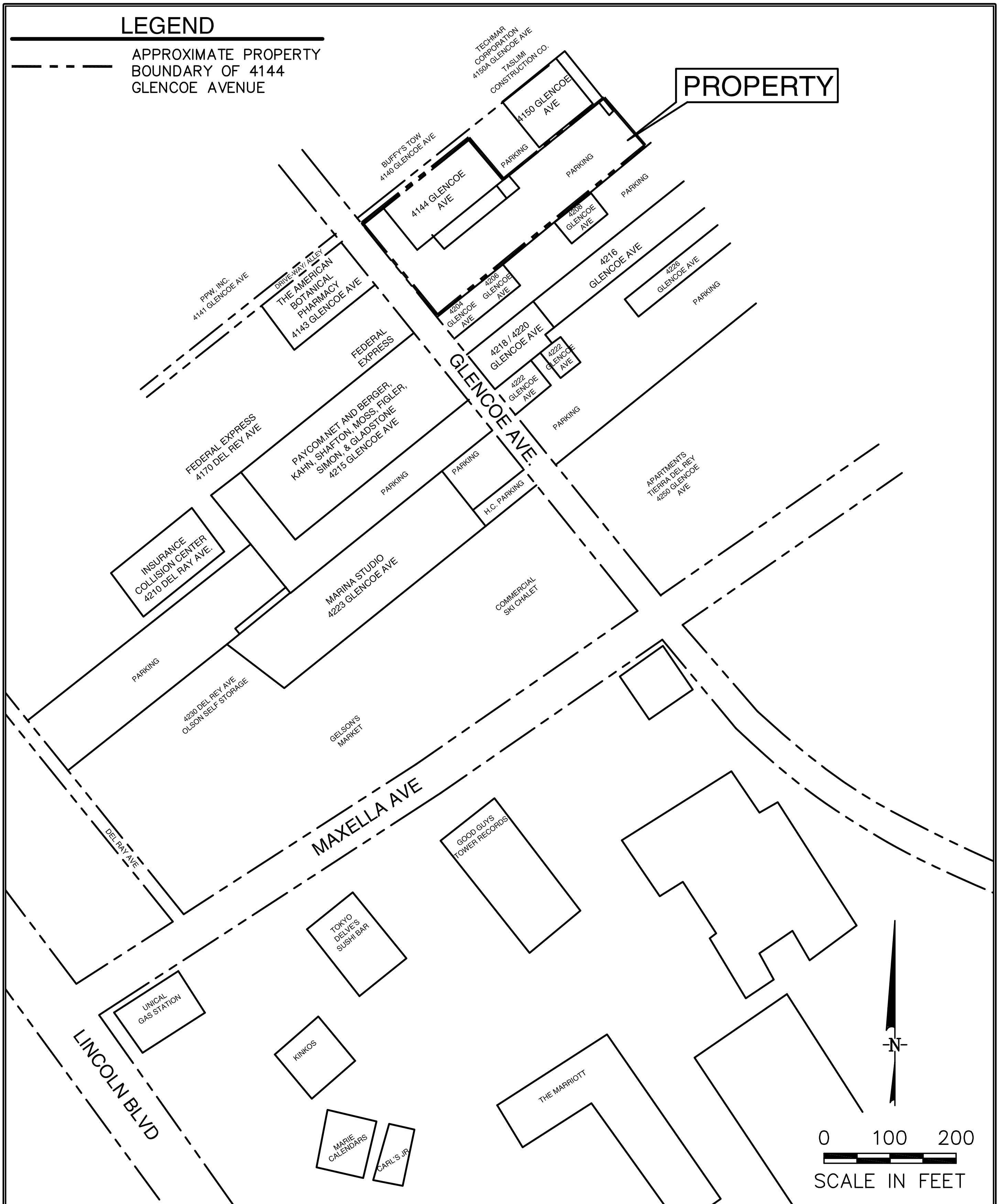

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

**GEOSYNTEC CONSULTANTS**

PROPERTY LAYOUT MAP
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 2-2 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F091.dwg 2/02/06 13:37 SBerdy



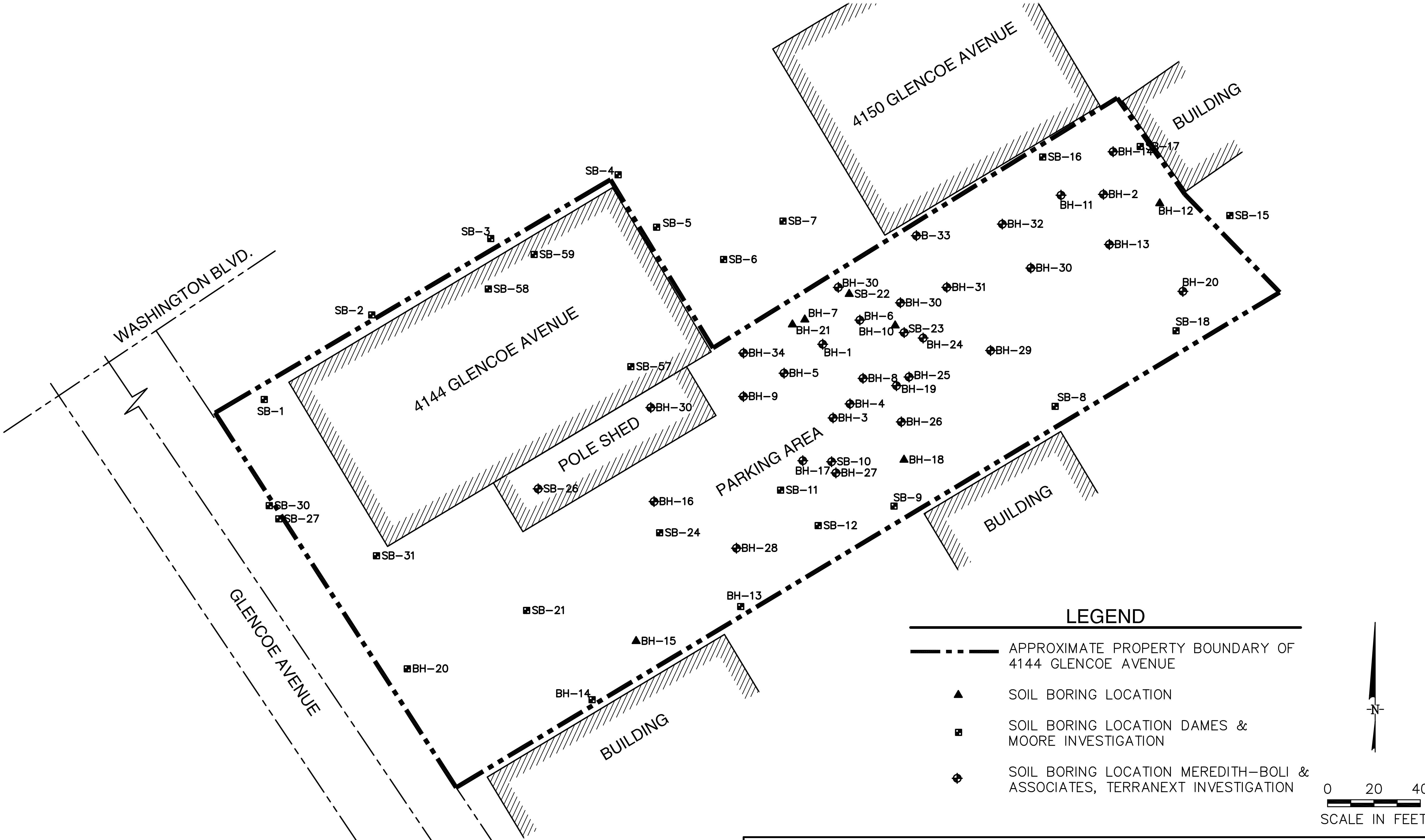

GEOSYNTEC CONSULTANTS

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

LAND USE IN PROPERTY VICINITY
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 2–3 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F090.dwg 2/02/06 13:36 SBerdy



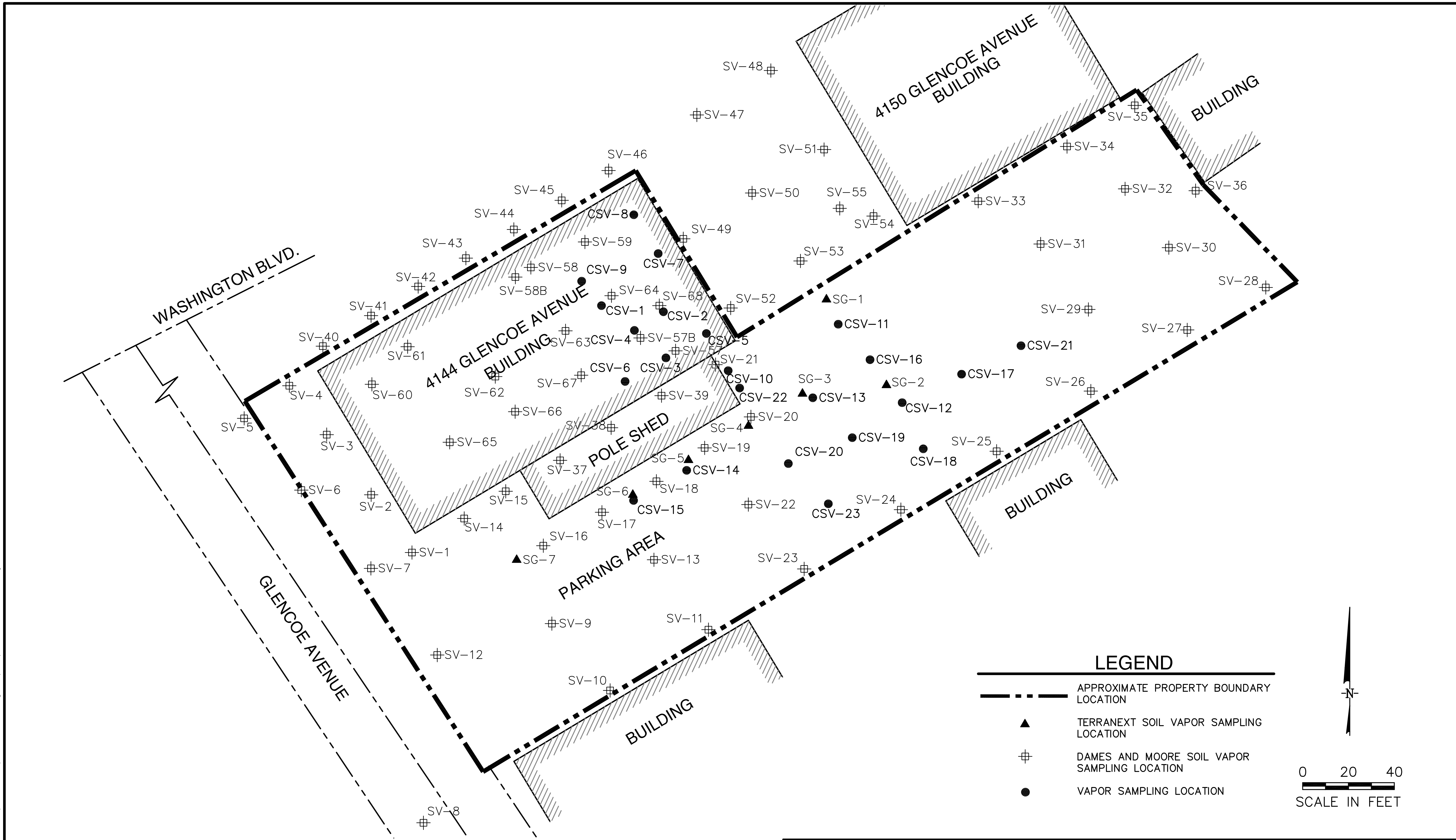

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

**GEOSYNTEC CONSULTANTS**

SOIL BORING AND SAMPLING LOCATIONS
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-1 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F089.dwg 2/02/06 13:34 SBerdy



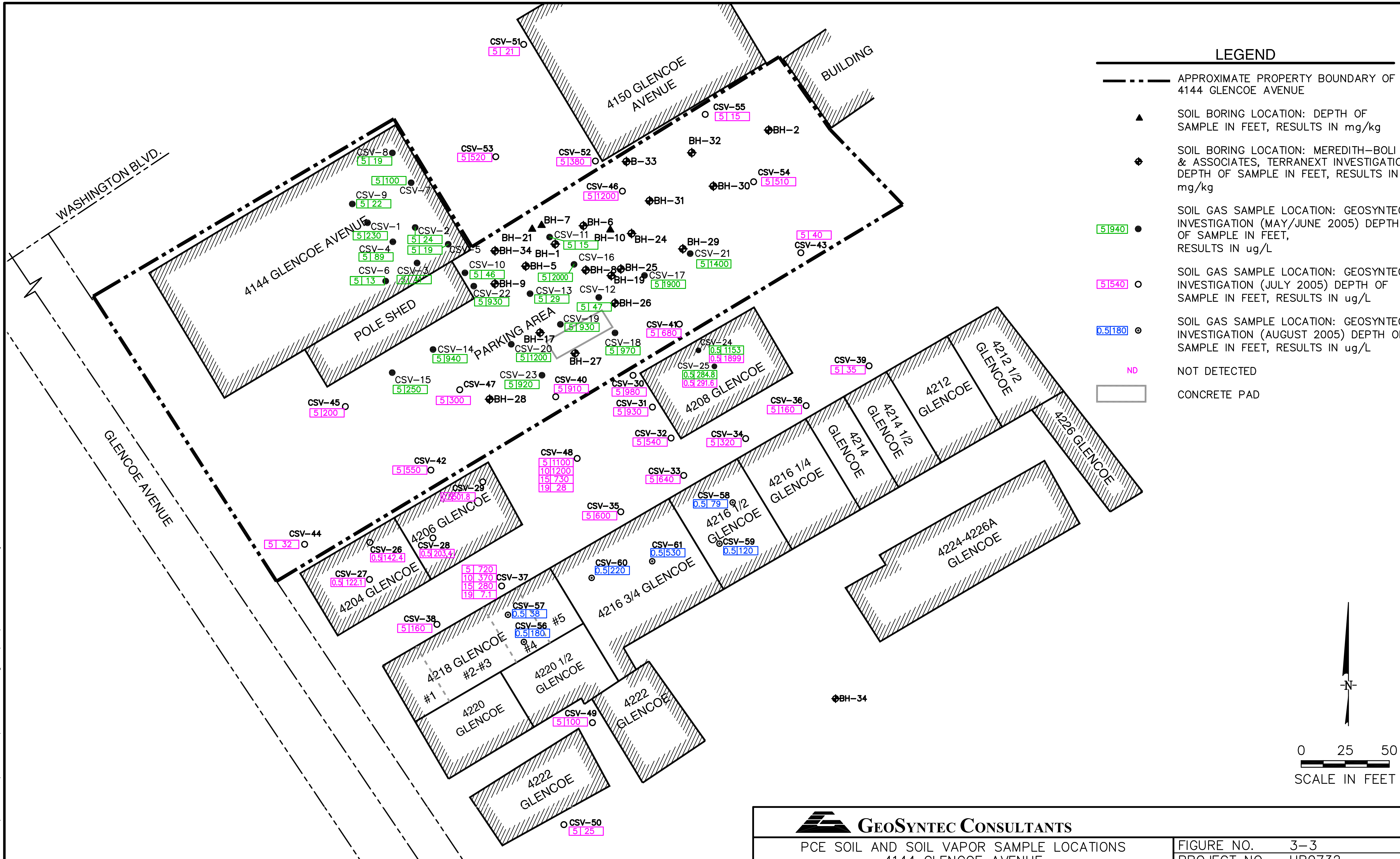

N:\CACADD\HR0732\FIGURES\0732F087.dwg 2/02/06 13:32 SBerdy

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

SOIL VAPOR SAMPLING LOCATIONS
4144 GLENCOE AVENUE
VENICE, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-2 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |



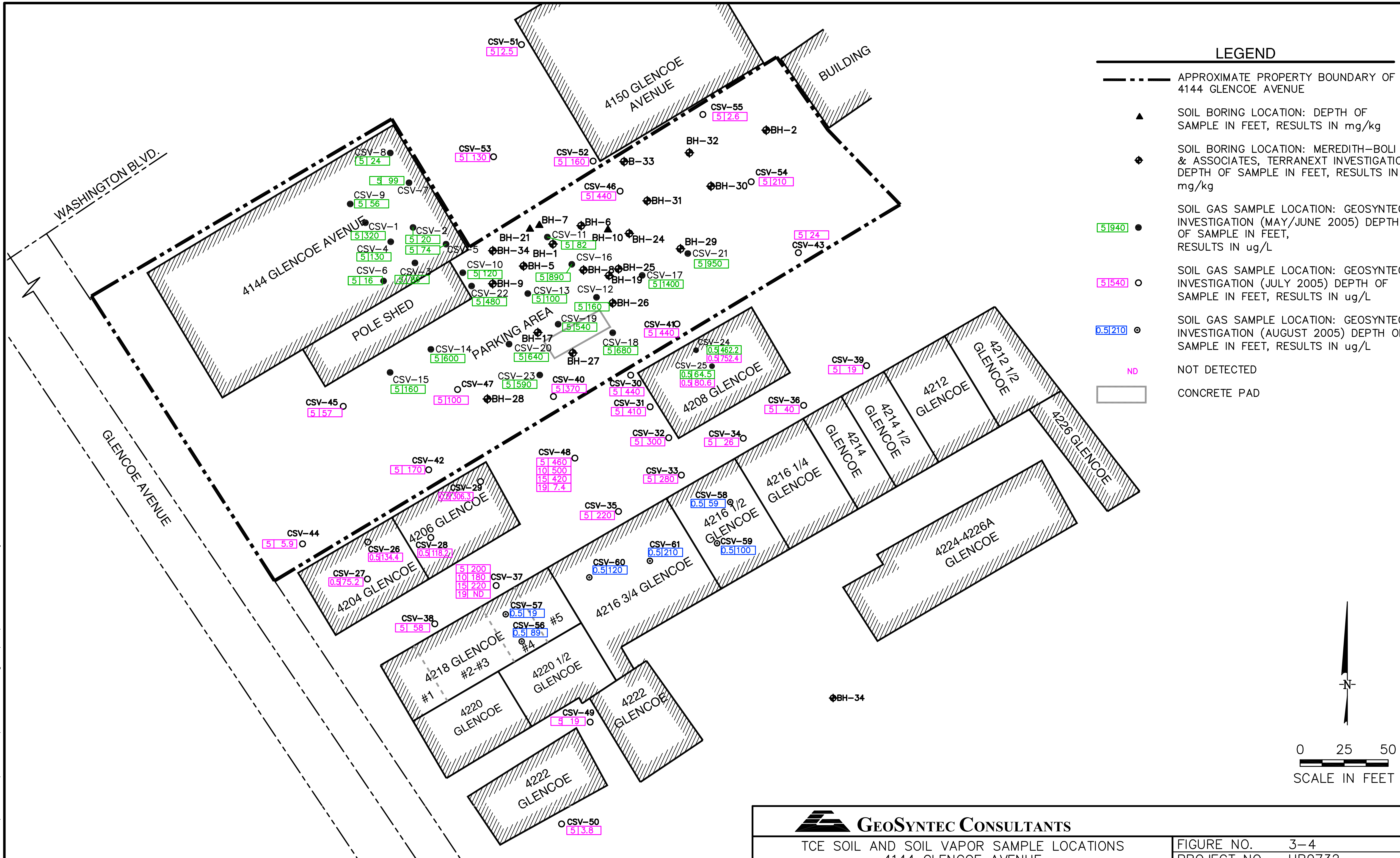

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

N:\CACADD\HR0732\FIGURES\0732F086.dwg 2/02/06 13:31 SBerdy

GEOSYNTEC CONSULTANTS

PCE SOIL AND SOIL VAPOR SAMPLE LOCATIONS
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-3 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |



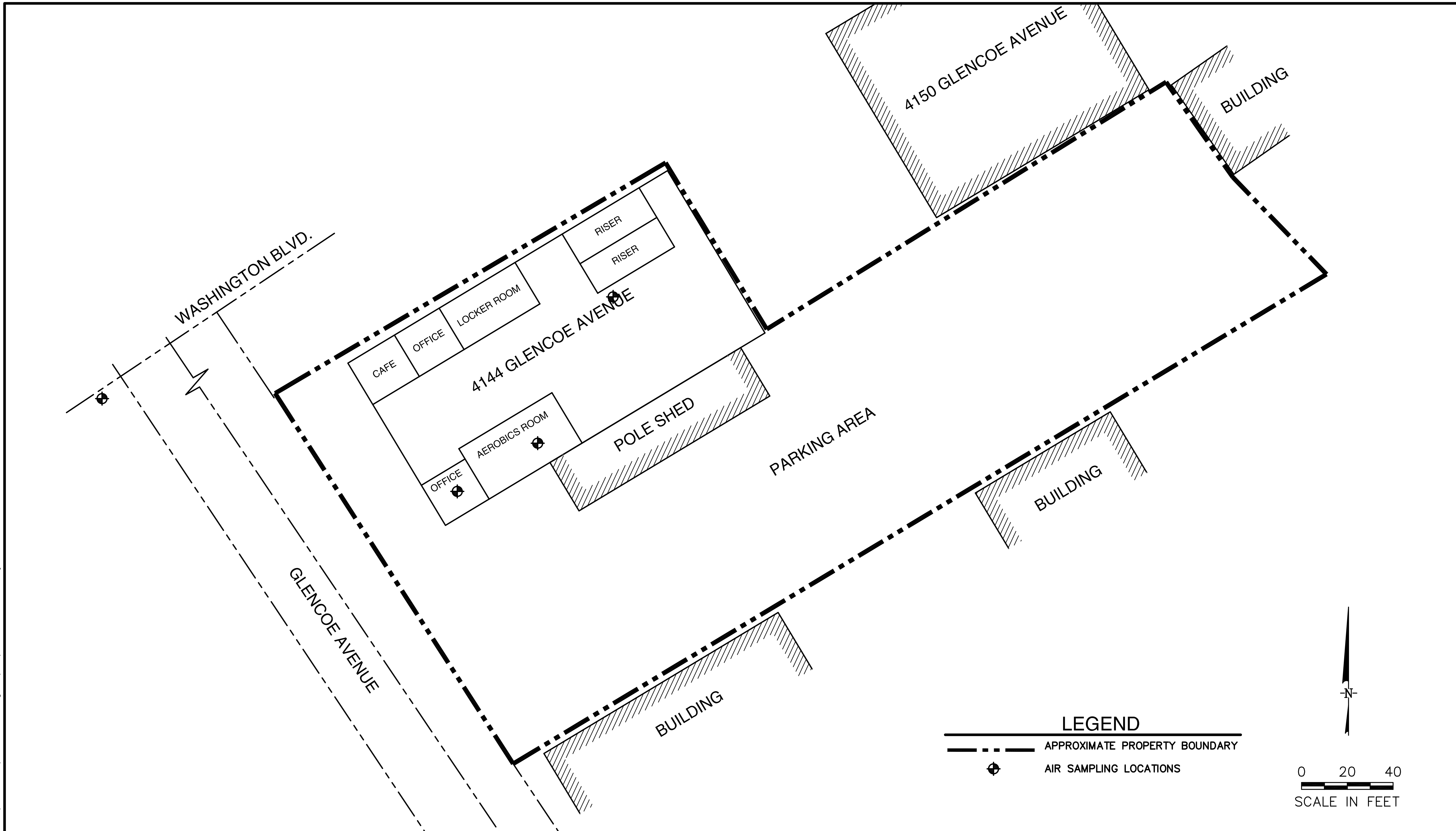

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

N:\CACADD\HR0732\FIGURES\0732F085.dwg 2/02/06 13:30 SBerdy

GEOSYNTEC CONSULTANTS

TCE SOIL AND SOIL VAPOR SAMPLE LOCATIONS
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3–4 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

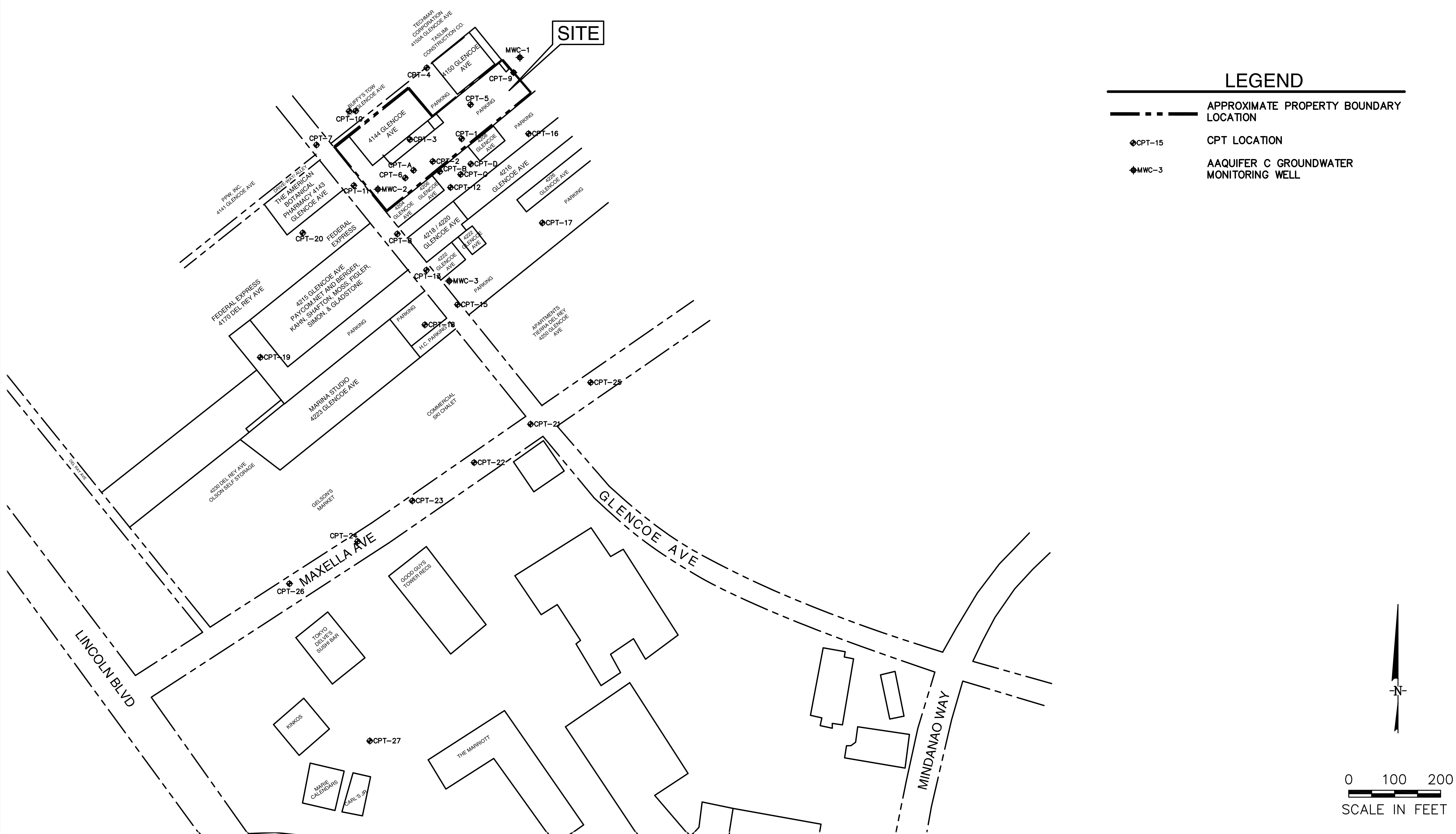



N:\CACADD\HR0732\FIGURES\0732F084.dwg 2/02/06 13:28 SBerdy

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

| | | |
|---|---|---|
| INDOOR AIR SAMPLING LOCATIONS<br>4144 GLENCOE AVENUE<br>LOS ANGELES, CALIFORNIA | FIGURE NO. | 3–5 |
| | PROJECT NO. | HR0732 |
| | DATE: | FEBRUARY 2006 |



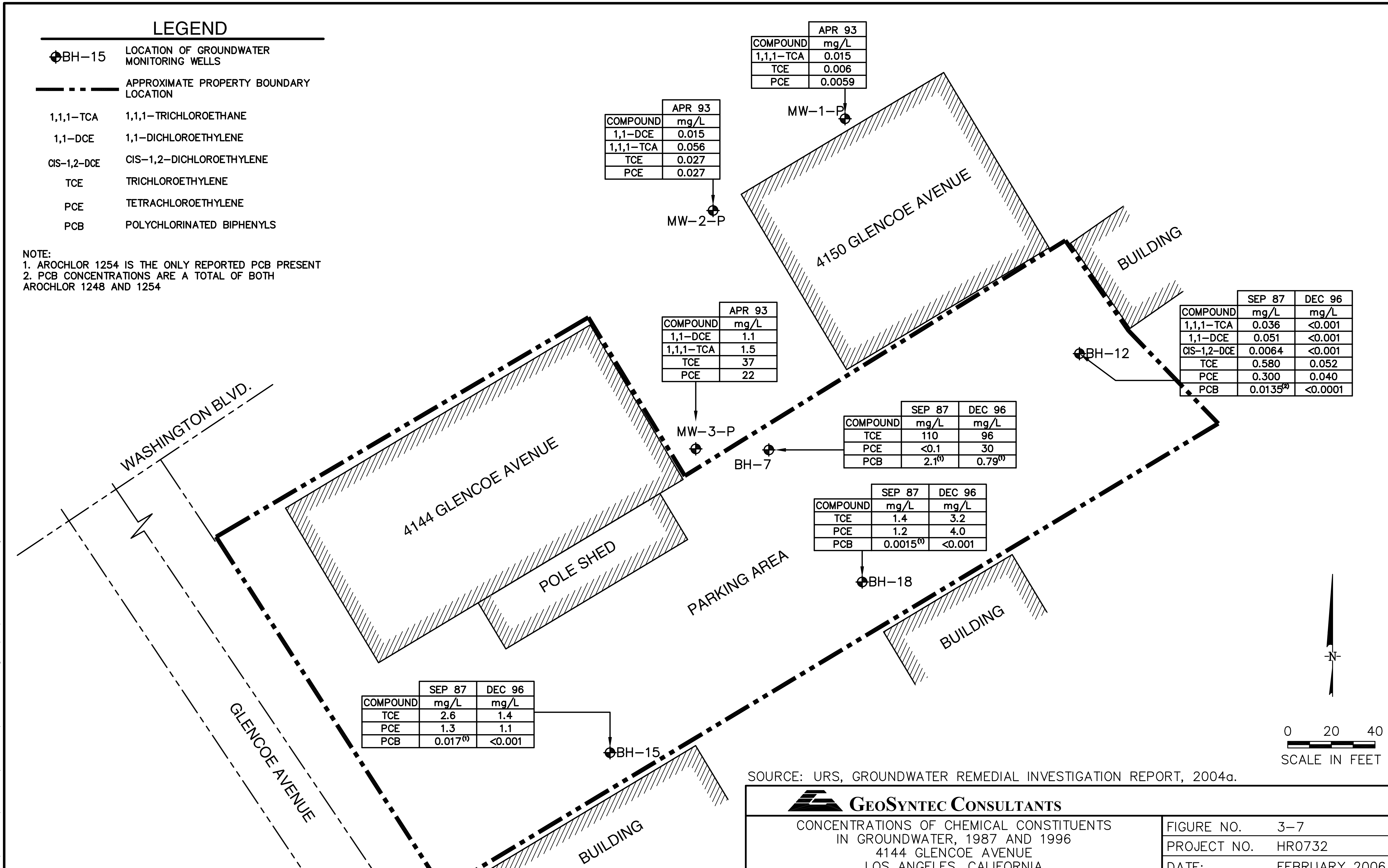

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

**GEOSYNTEC CONSULTANTS**

GROUNDWATER RI SAMPLING LOCATIONS
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-6 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F083.dwg 2/02/06 13:27 SBerdy




MW–1–P

| COMPOUND | APR 93 mg/L |
|---|---|
| 1,1,1–TCA | 0.015 |
| TCE | 0.006 |
| PCE | 0.0059 |

MW–2–P

| COMPOUND | APR 93 mg/L |
|---|---|
| 1,1–DCE | 0.015 |
| 1,1,1–TCA | 0.056 |
| TCE | 0.027 |
| PCE | 0.027 |

MW–3–P

| COMPOUND | APR 93 mg/L |
|---|---|
| 1,1–DCE | 1.1 |
| 1,1,1–TCA | 1.5 |
| TCE | 37 |
| PCE | 22 |

BH–12

| COMPOUND | SEP 87 mg/L | DEC 96 mg/L |
|---|---|---|
| 1,1,1–TCA | 0.036 | <0.001 |
| 1,1–DCE | 0.051 | <0.001 |
| CIS–1,2–DCE | 0.0064 | <0.001 |
| TCE | 0.580 | 0.052 |
| PCE | 0.300 | 0.040 |
| PCB | 0.0135(2) | <0.0001 |

BH–7

| COMPOUND | SEP 87 mg/L | DEC 96 mg/L |
|---|---|---|
| TCE | 110 | 96 |
| PCE | <0.1 | 30 |
| PCB | 2.1(1) | 0.79(1) |

BH–18

| COMPOUND | SEP 87 mg/L | DEC 96 mg/L |
|---|---|---|
| TCE | 1.4 | 3.2 |
| PCE | 1.2 | 4.0 |
| PCB | 0.0015(1) | <0.001 |

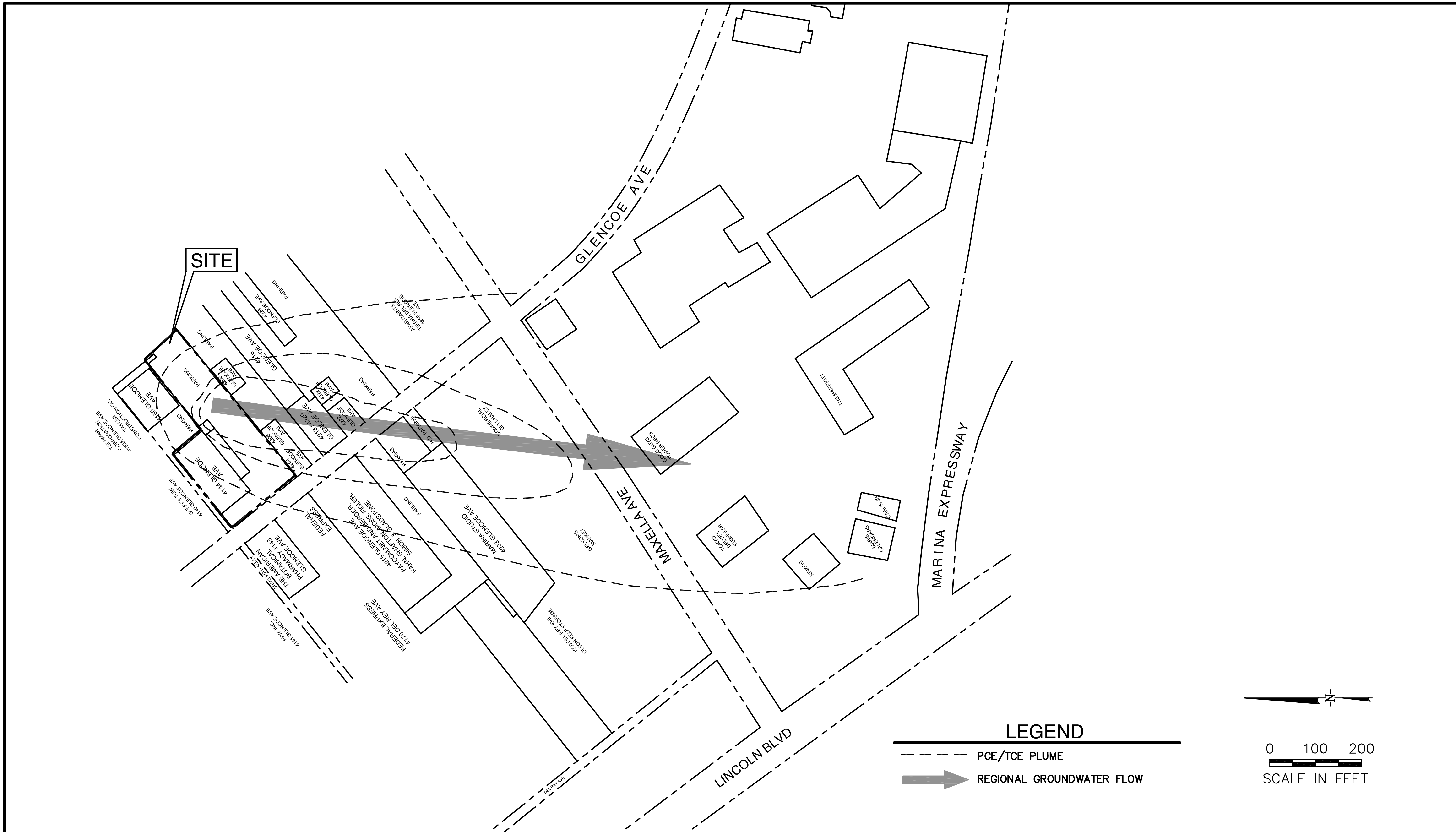
BH–15

| COMPOUND | SEP 87 mg/L | DEC 96 mg/L |
|---|---|---|
| TCE | 2.6 | 1.4 |
| PCE | 1.3 | 1.1 |
| PCB | 0.017(1) | <0.001 |

GEOSYNTEC CONSULTANTS

CONCENTRATIONS OF CHEMICAL CONSTITUENTS
IN GROUNDWATER, 1987 AND 1996
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3–7 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |



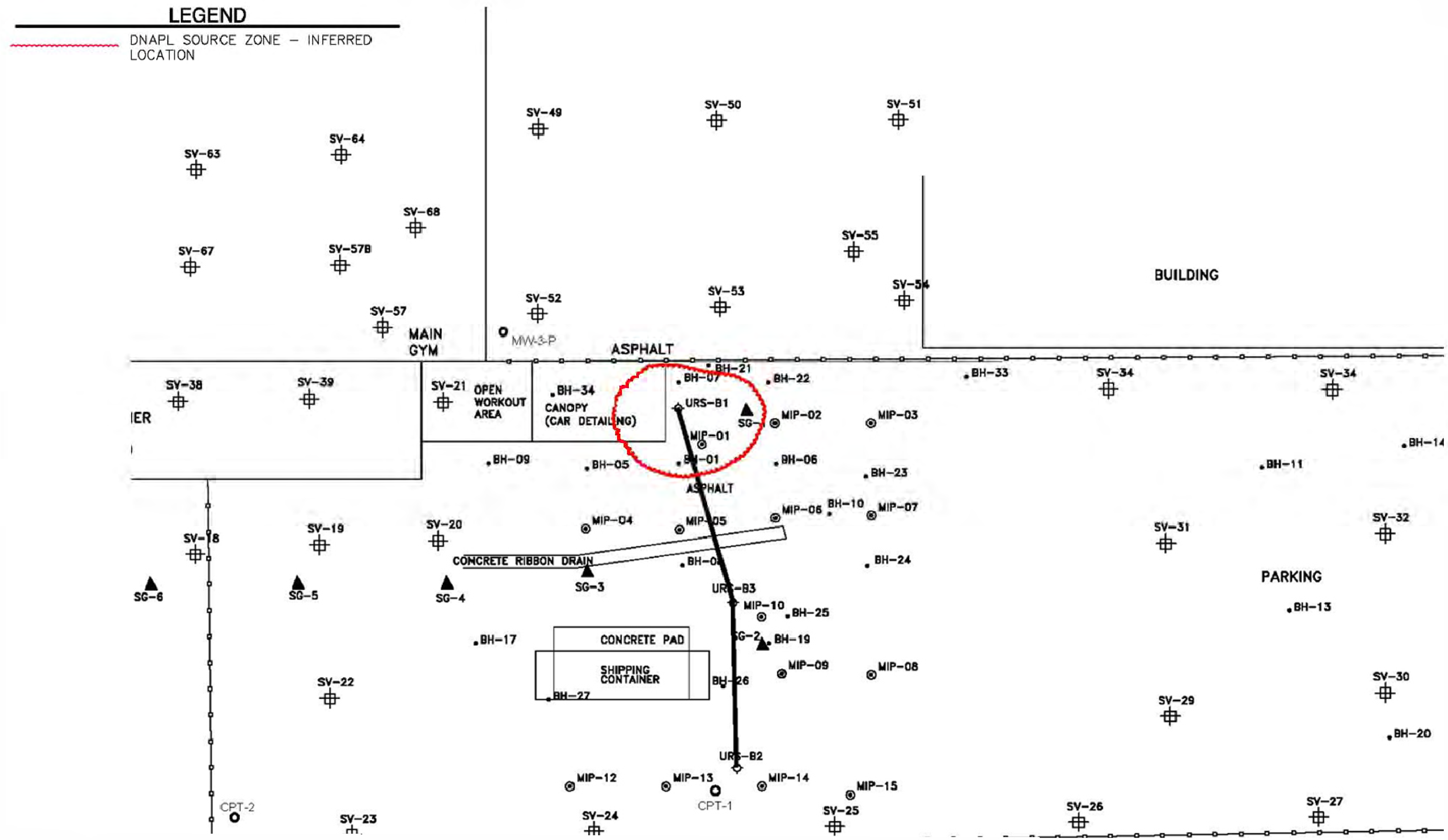

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

ESTIMATED EXTENT OF GROUNDWATER PLUME
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-8 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F081.dwg 2/02/06 13:25 SBerdy



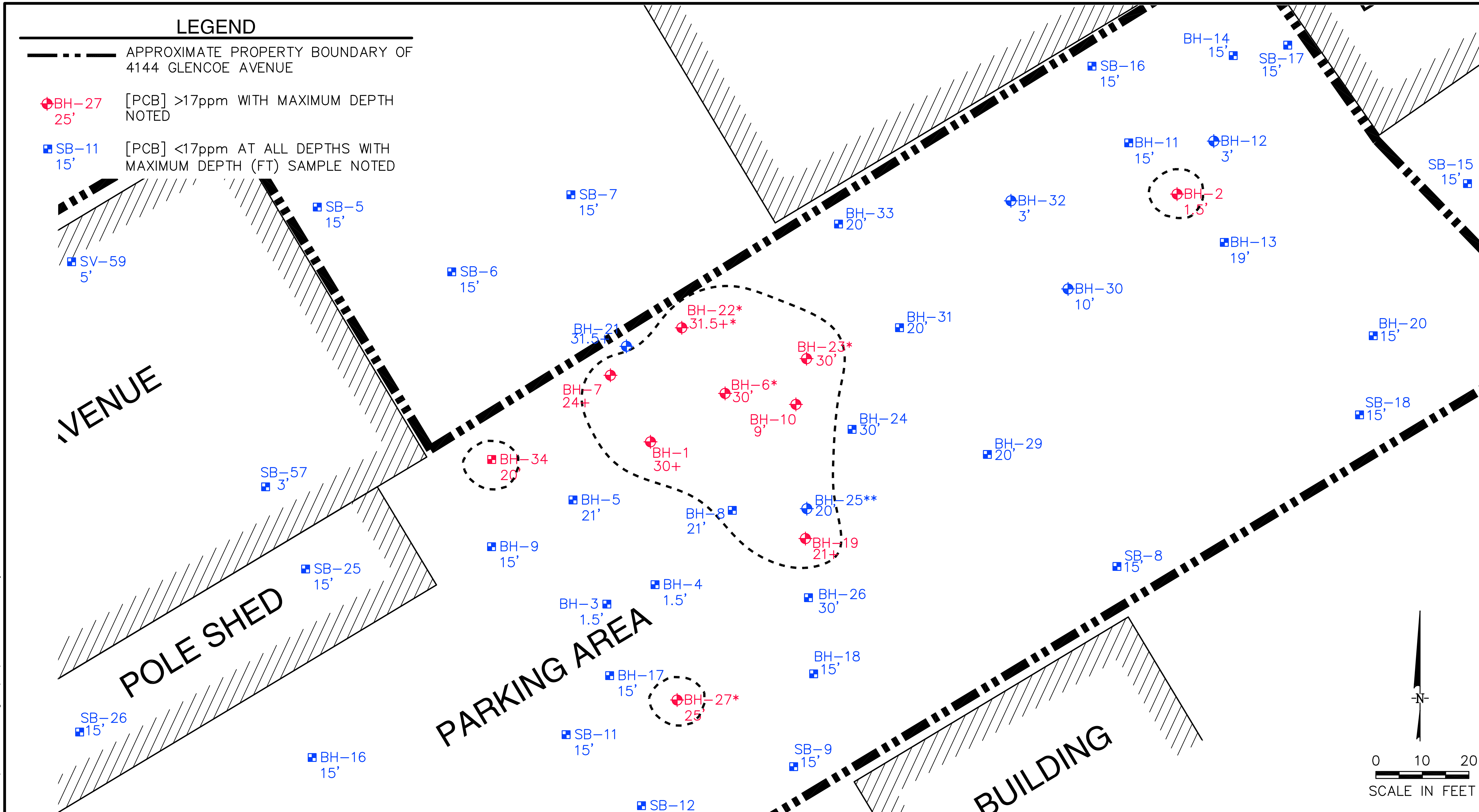

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

ESTIMATED DELINEATION OF DNAPL SOURCE AREA
4144 GLENCOE AVENUE
VENICE, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 3-9 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F074.dwg 2/02/06 12:55 SBerdy




* PCB CONCENTRATIONS ATTENUATE TO ≤ 1ppm ABOVE GROUNDWATER
** PCB CONCENTRATIONS <1ppm ABOVE GROUNDWATER

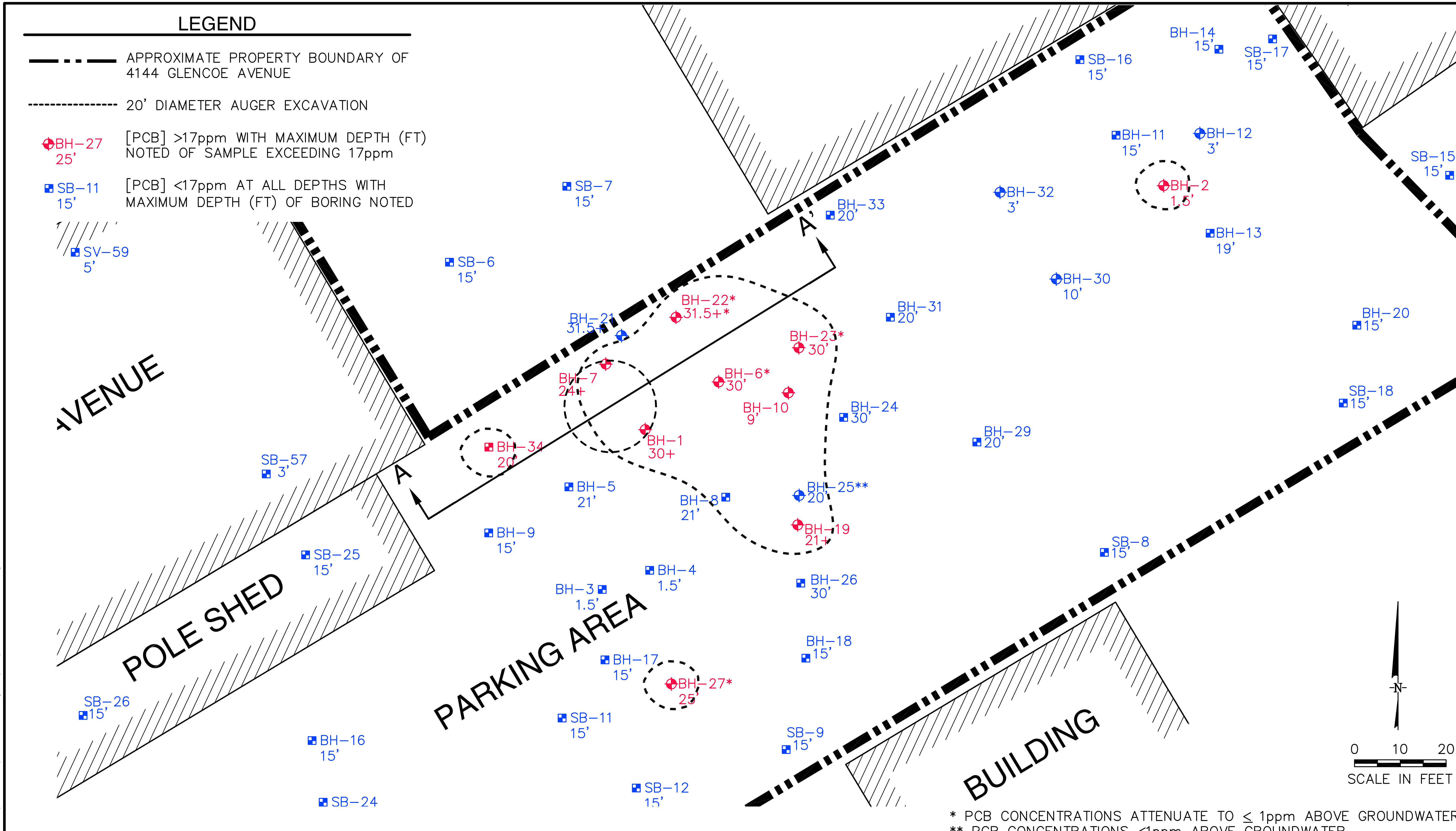
SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

AREA OF SHALLOW SOIL EXCAVATION
4144 GLENCOE AVENUE
VENICE, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 6-1 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F080.dwg 2/17/06 07:54 SBerdy




GeoSyntec Consultants

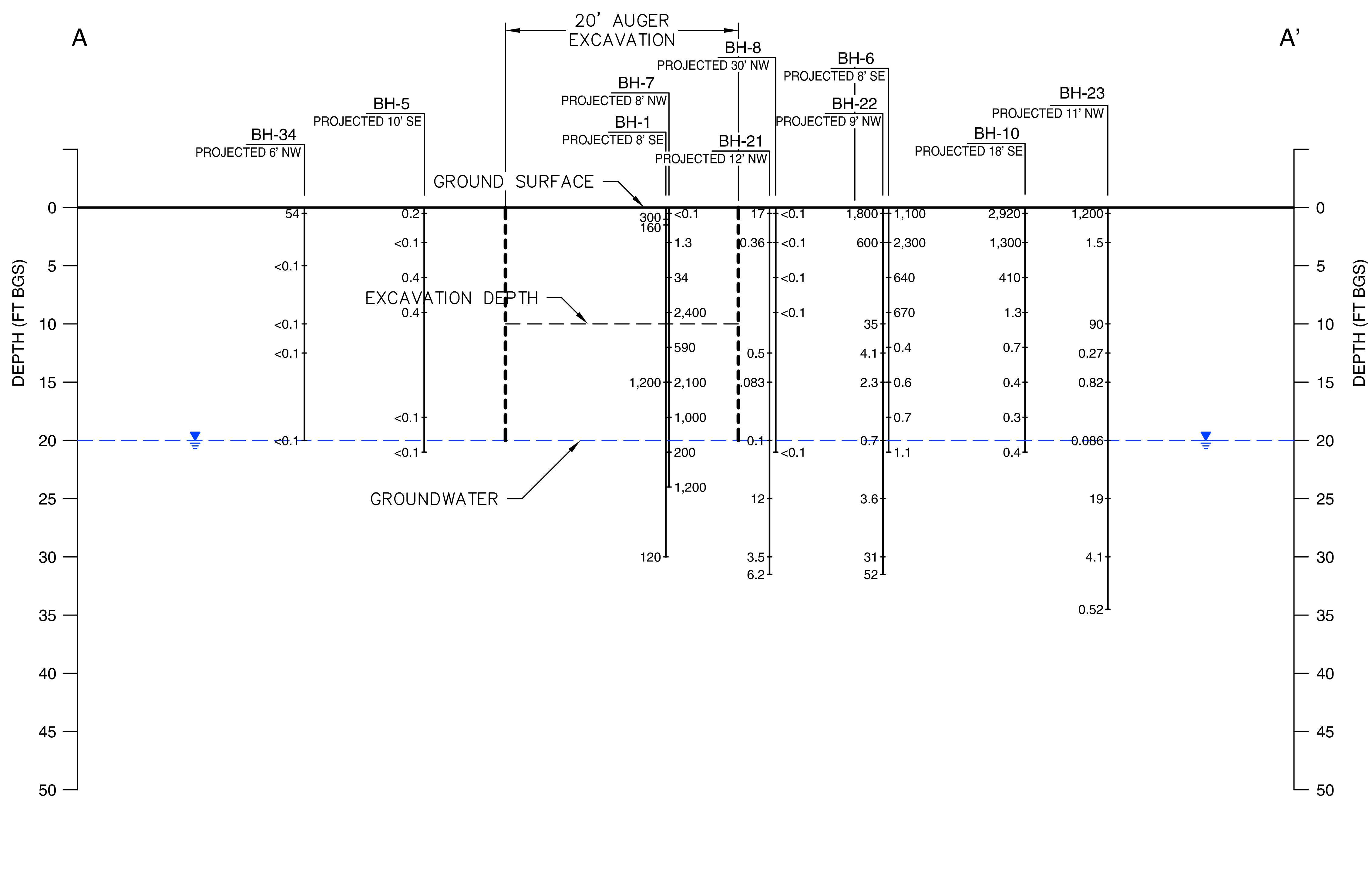
SHALLOW SOIL AND AUGER EXCAVATION SCHEMATIC
4144 GLENCOE AVENUE
VENICE, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 6-2 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

N:\CACADD\HR0732\FIGURES\0732F075.dwg 2/02/06 12:57 SBerdy

# CROSS-SECTION A-A'




NOTES:

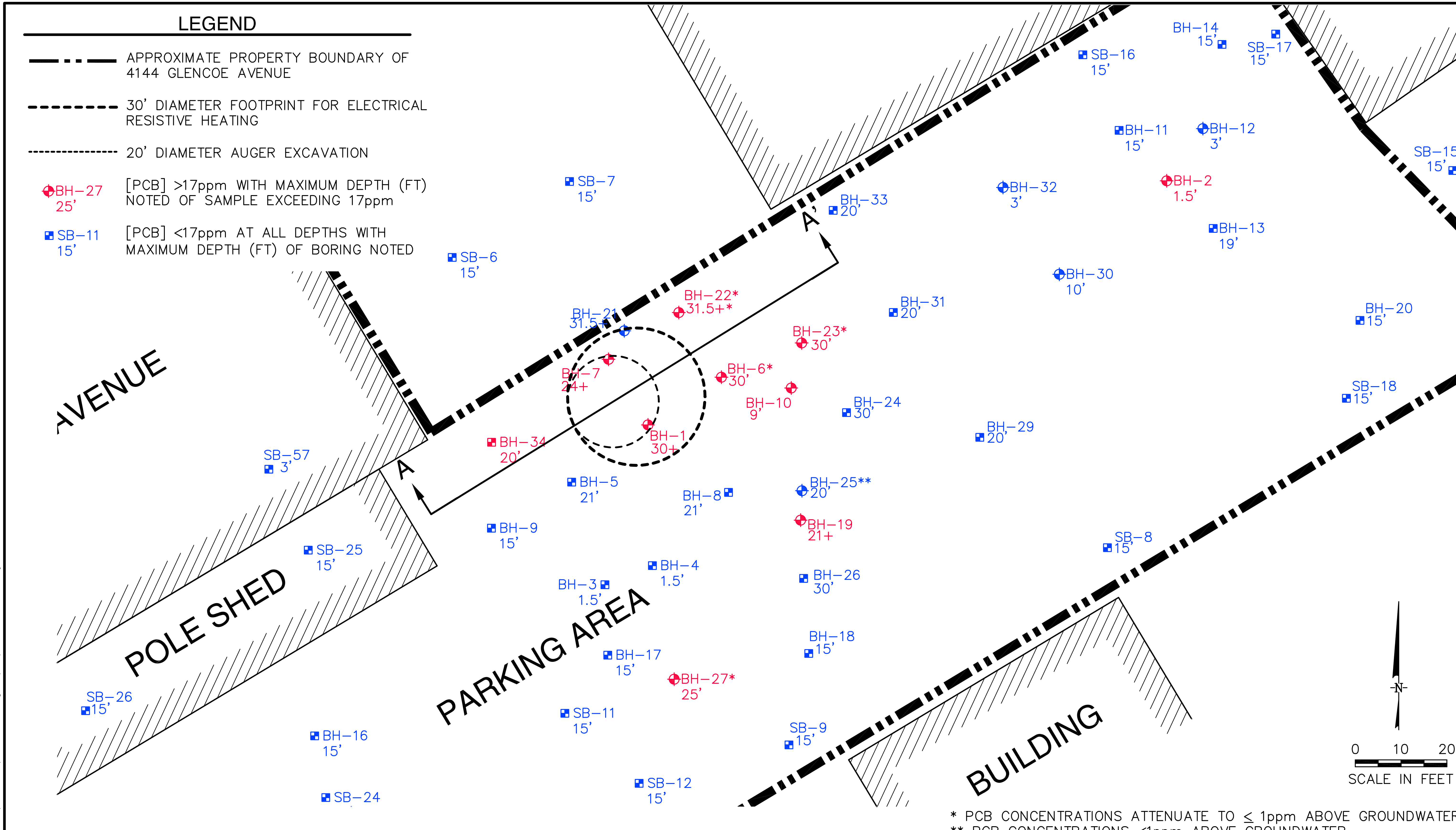
1. ALL CONCENTRATIONS ARE IN mg/kg
2. FT BGS = FEET BELOW GROUND SURFACE
3. THE EXCAVATION DEPTH INDICATES THE MAXIMUM DEPTH OF EXCAVATION (OUTSIDE OF AUGER EXCAVATION AREA) OF PCB SOIL CONCENTRATIONS EXCEEDING 17 mg/kg.

GEOSYNTEC CONSULTANTS

CROSS-SECTION A-A'
PCB SOIL CONCENTRATIONS
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 6-3 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F078.dwg 2/02/06 13:04 SBerdy



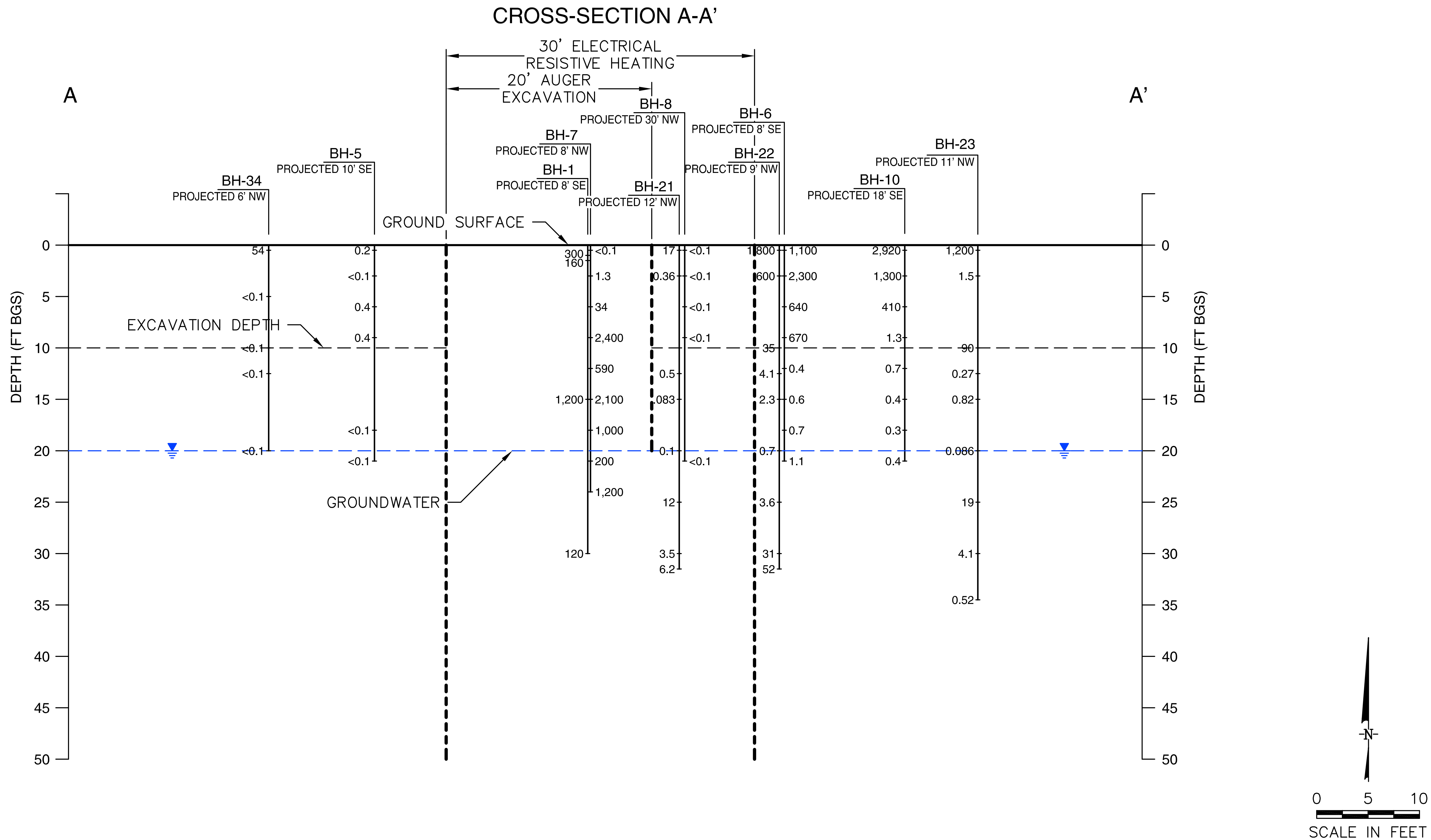

N:\CACADD\HR0732\FIGURES\0732F077.dwg 2/02/06 13:02 SBerdy

SOURCE: URS, GROUNDWATER REMEDIAL INVESTIGATION REPORT, 2004a.

GEOSYNTEC CONSULTANTS

ELECTRICAL RESISTIVE HEATING AND AUGER EXCAVATION SCHEMATIC
4144 GLENCOE AVENUE
VENICE, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 7-1 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |




NOTES:

1. ALL CONCENTRATIONS ARE IN mg/kg

2. FT BGS = FEET BELOW GROUND SURFACE

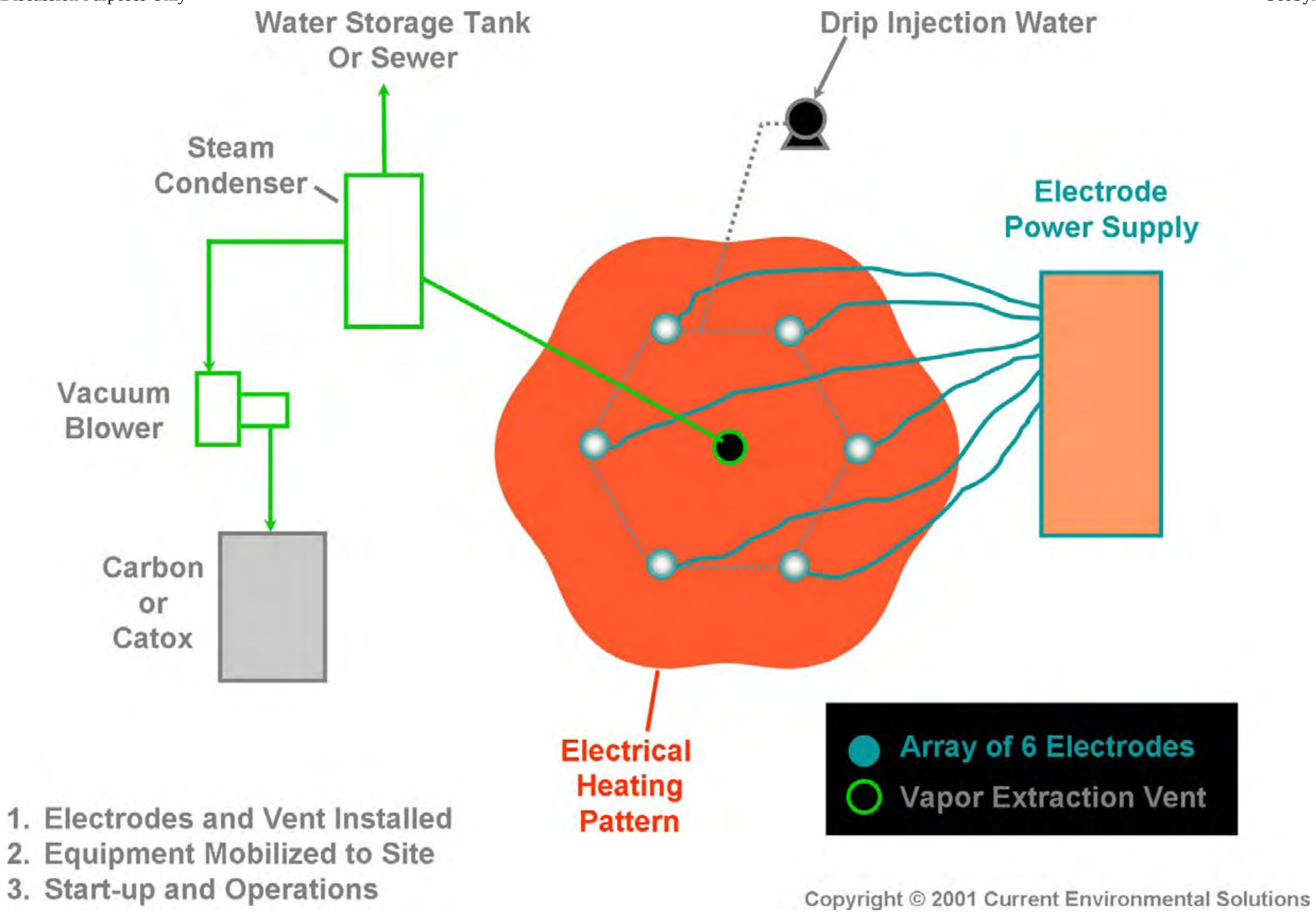
3. THE EXCAVATION DEPTH INDICATES THE MAXIMUM DEPTH OF EXCAVATION (OUTSIDE OF AUGER EXCAVATION AREA) OF PCB SOIL CONCENTRATIONS EXCEEDING 17 mg/kg.

GEOSYNTEC CONSULTANTS

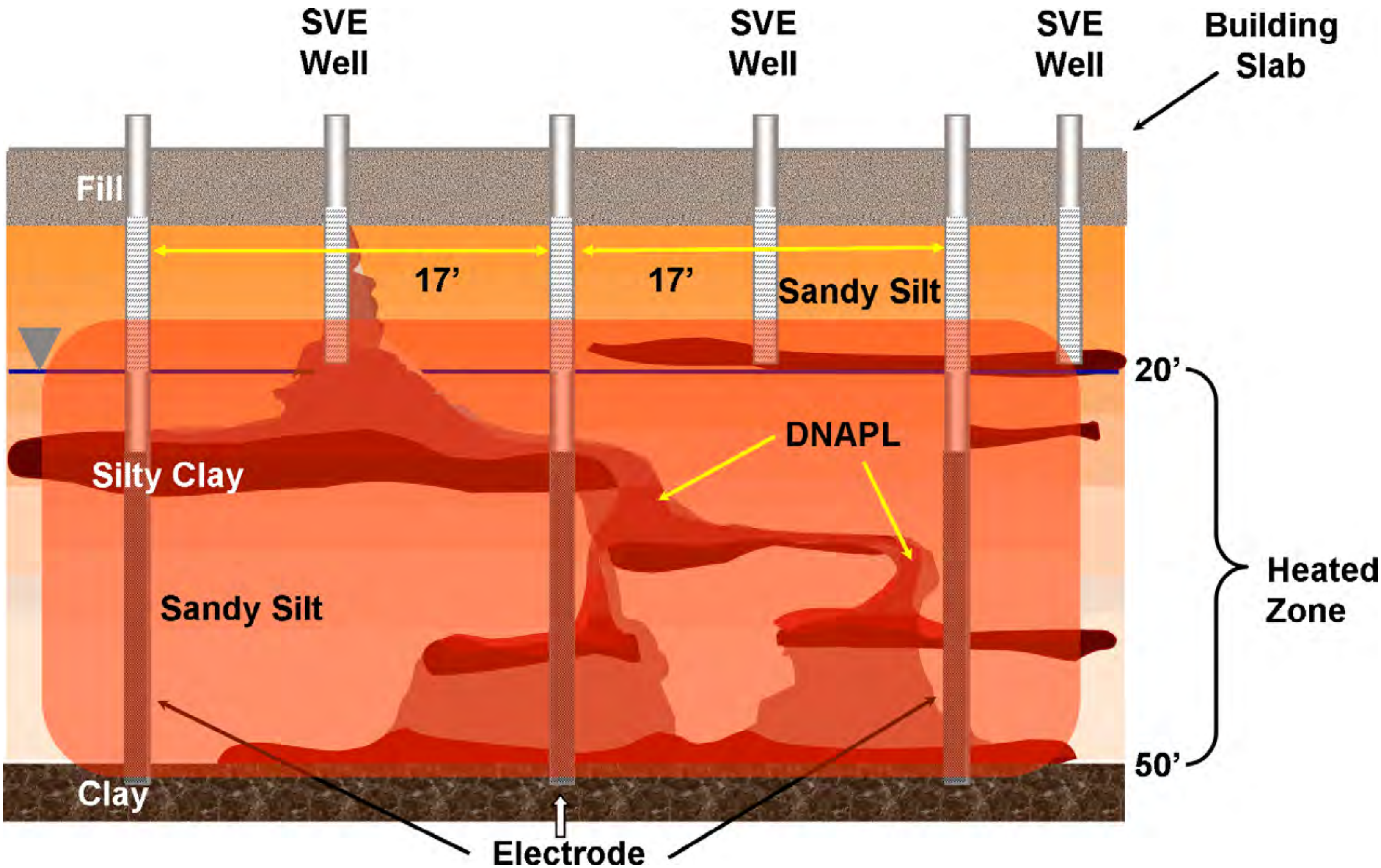
CROSS-SECTION A-A'
ELECTRICAL RESISTIVE HEATING AND AUGER EXCAVATION PROFILE
4144 GLENCOE AVENUE
LOS ANGELES, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 7-2 |
| PROJECT NO. | HR0732 |
| DATE: | FEBRUARY 2006 |

N:\CACADD\HR0732\FIGURES\0732F076.dwg 2/02/06 13:01 SBerdy

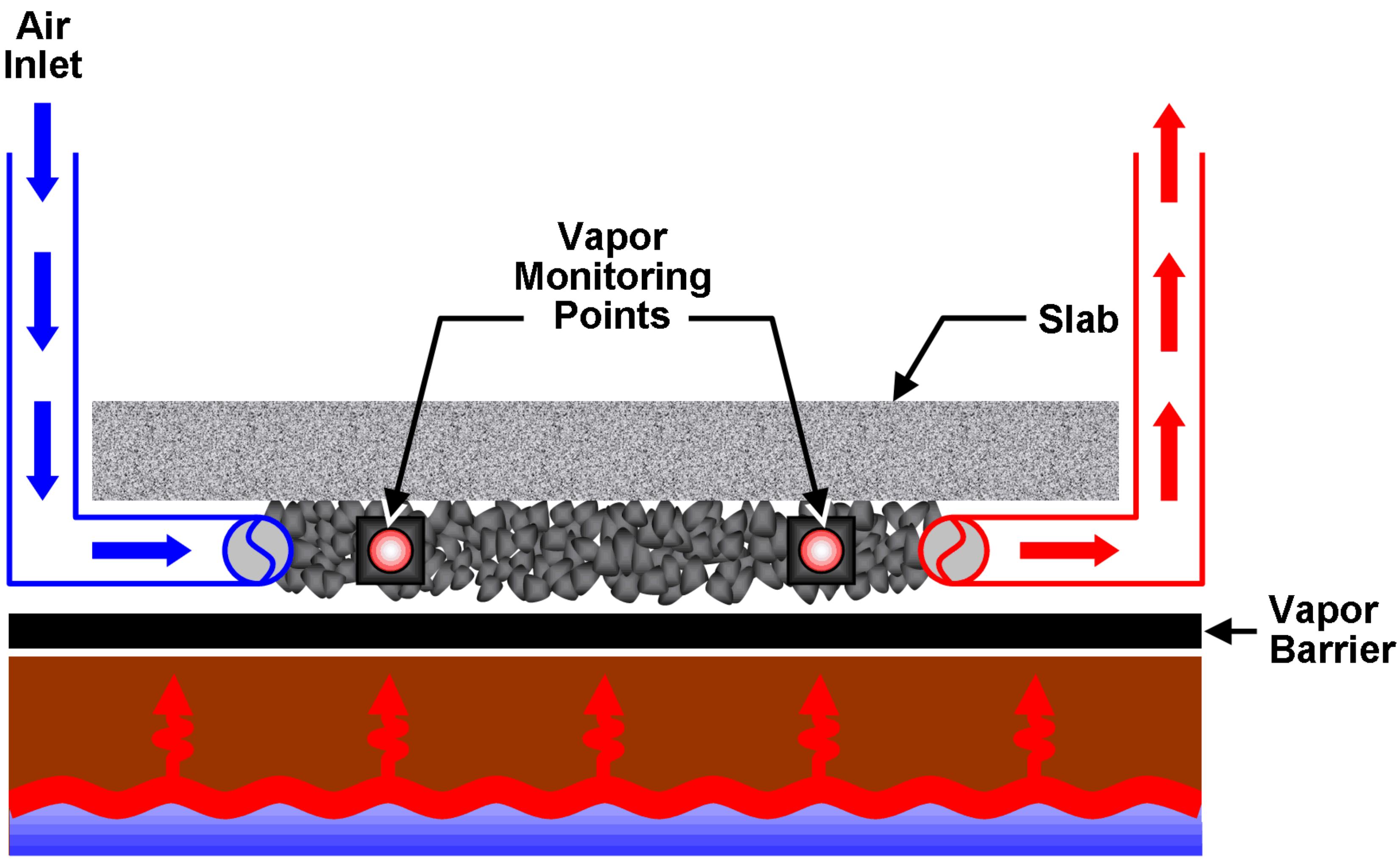



| GEOSYNTEC CONSULTANTS | | |
|---|---|---|
| GENERAL PLAN VIEW SCHEMATIC FOR ELECTRICAL RESISTIVE HEATING 4144 GLENCOE AVENUE SITE VENICE, CALIFORNIA | FIGURE NO.: | 7-3 |
| | PROJECT NO.: | HR0732 |
| | DATE: | FEBRUARY 2006 |




GEOSYNTEC CONSULTANTS

| GENERAL CROSS-SECTION SCHEMATIC FOR ELECTRICAL RESISTIVE HEATING 4144 GLENCOE AVENUE SITE VENICE, CALIFORNIA | FIGURE NO.: 7-4 |
|---|---|
| | PROJECT NO.: HR0732 |
| | DATE: FEBRUARY 2006 |




GEOSYNTEC CONSULTANTS

| | | |
|---|---|---|
| VAPOR CONTROL SYSTEM<br>TYPICAL CONSTRUCTION<br>4144 GLENCOE AVENUE SITE<br>VENICE, CALIFORNIA | FIGURE NO.: | 7-5 |
| | PROJECT NO.: | HR0732 |
| | DATE: | FEBRUARY 2006 |

# APPENDIX A

# ADMINISTRATIVE RECORD LIST

# Administrative Record List

Former Cornell Dubilier Electronics (CDE)/ 4144 Glencoe Avenue Site, Venice California
List of key project documents submitted to DTSC

| Date MM/DD/YY | Author | Receiver | Title of Document |
|---|---|---|---|
| 7/29/86 | Meredith/Boli and Associates, Inc. for CDE | DTSC | Results of a Preliminary Field Investigation |
| 5/18/88 | Meredith/Boli and Associates, Inc. for CDE | DTSC | Expanded Site Investigation Report |
| 1/29/96 | TerraNext for CDE | DTSC | Scoping Document for Removal Action |
| 10/7/96 | TerraNext for CDE | DTSC | Revised Workplan for Confirmation Sampling |
| 5/12/97 | TerraNext for CDE | DTSC | Draft Interim Remedial Measure Workplan |
| 6/3/97 | TerraNext for CDE | DTSC | Soil Vapor Sampling Workplan |
| 6/23/97 | Interphase Environmental for CDE via TerraNext | DTSC | Shallow Soil Gas Survey |
| 7/14/97 | TerraNext for CDE | DTSC | Groundwater Quality Sampling and Analysis Plan |
| 8/14/98 | Dames & Moore for CDE | DTSC | Workplan Air Sampling Program |
| 8/25/99 | Dames & Moore for CDE | DTSC | Summary Report Air Quality Monitoring |
| 12/29/99 | Dames & Moore for CDE | DTSC | Summary Report Soil Remedial Investigations |
| 2/3/04 | URS Corporation for CDE | DTSC | Groundwater Remedial Investigation Report |
| 8/25/00 | URS Corporation for CDE | DTSC | Revised Soil Remedial Investigation Report |
| 4/23/04 | URS Corporation for CDE | DTSC | Letter report to supplement Soil Remedial Investigation Report (December 1999, revised August 2000) |
| 4/23/04 | URS Corporation for CDE | DTSC | Risk Assessment |
| 6/30/05 | GeoSyntec Consultants for CDE | DTSC | Feasibility Study Report |
| 9/9/05 | GeoSyntec Consultants for CDE | DTSC | Supplement to Feasibility Study Report |

# APPENDIX B

# STATEMENT OF REASONS

# APPENDIX B

## Statement of Reasons
## 4144 Glencoe Avenue
## Venice, CA

Pursuant to California Health and Safety Code (HSC), Section 25356.1(d), the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) has prepared this Statement of Reasons as part of the attached Remedial Action Plan (RAP) for 4144 Glencoe Avenue (Property) in the Venice area of the City of Los Angeles, Los Angeles County, California.

Soil and groundwater at the Property are contaminated. The area impacted by Property contamination, both on-Property and off-Property, is referred to hereinafter as the "Site". The RAP presents a summary of the Remedial Investigation (RI) to address chemicals found at the Site. The most prevalent chemicals are polychlorinated biphenyls (PCBs) and two volatile organic compounds (VOCs): perchloroethylene (PCE) and trichloroethylene (TCE). Other chemicals found include minor amounts of certain metals and other VOCs, none of which are of significant concern from a risk or remedy standpoint. PCBs and VOCs at the Site were detected in soil. VOCs also were detected in soil vapor and in groundwater. The RAP summarizes the results of a health risk assessment (HRA) performed to determine the potential risks to public health and the environment associated with the detected PCBs and VOCs. The RAP also provides a discussion of the feasible remedial alternatives that were evaluated in the Feasibility Study (FS) Report. The RAP recommends a remedial alternative that will meet the objectives of protecting public health and the environment. The recommended remedial alternative includes the following elements:

- Construction and operation of an electrical resistive heating array approximately 30 feet in diameter within the source zone (from ground surface to 50 feet bgs) for mass removal of PCE and TCE and reduction of VOC concentrations in the dissolved phase plume;

- Shallow soil excavation of approximately 900 cy of material to remove PCBs greater than 17 mg/kg in the top ten feet of soil, resulting in a Property-wide average of 6.4 mg/kg (acceptable commercial worker exposure);

- Soil column excavation that would consist of removing approximately 340 cy of soils impacted with high concentrations of PCBs within the

Source Zone. The excavation would occur at a depth of 10 feet bgs to 20 feet bgs, since the top ten feet of soil within this soil column will have already been removed due to the shallow soil excavation step described above;

- Conducting a post-remedy soil vapor baseline survey for assessment of the decline in soil vapor concentrations;

- Institutional controls that would prohibit sensitive land uses, would permit mixed-use redevelopment consisting of first floor commercial / non-residential use and upper floor residential use, and would prohibit on-Site groundwater extraction;

- Engineered controls that would consist of an underlying vapor control system comprising a geocomposite vapor barrier under the concrete slab, an air inlet, and vapor monitoring points;

- Groundwater monitoring to evaluate the effectiveness of remediation over time and manage the dissolved phase plume; and

- A formal review of remediation effectiveness after five years.

The DTSC believes that the RAP complies with the law as specified in California Health and Safety Code, Section 25356.1. Section 25356.1 (e) requires that RAPs "shall include a statement of reasons setting forth the basis for the removal and remedial actions selected." The statement of reasons "shall also include an evaluation of the consistency of the removal and remedial actions proposed by the plan with the federal regulations and factors specified in subdivision (d) … "Subdivision (d) specifies six factors against which the remedial alternatives in the RAP must be evaluated. The proposed remedial action is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan ["NCP"]), the federal Superfund regulations. The attached RAP has addressed all these factors. A brief summary of each factor follows.

1. Health and Safety Risks - HSC, Section 25356.1 (d) (1)

   The chemicals of concern identified for the Site are PCBs, PCE and TCE in soil. In soil vapor and groundwater the chemicals of concern are PCE and TCE.

The risk assessment evaluated potential exposures for potential receptors for on-Site and off-Site exposure scenarios were identified in the RA. The receptors were determined by evaluating the current and future land use of the Property. The following potential receptors were evaluated in the RA:

- Current On-Property Landscaper and Utility Worker;
- Current Off-Property Landscaper and Utility Worker;
- Current Off-Property Resident;
- Future On-Property Resident; and
- Future On-Property Landscaper and Utility Worker.

The RA presented an analysis of the potential future health risk for on-Property landscapers and utility workers, but not specifically for trench workers or users of an underground parking structure. Because of the potential for trench worker exposures or underground parking structure exposures to be associated with future Property development, a scenario addressing each potential exposure has been developed. These scenarios are included in the RAP.

The results of the RA indicated that there is no unacceptable risk for current Property receptors, which include users and employees of the fitness center, landscapers and utility/trench workers, or current off-Property receptors including commercial workers and residents. Cancer risks and noncancer hazards for current on-Property landscapers and utility/trench workers potentially exposed to indoor air vapors in the existing fitness center were not evaluated due to the prior evaluation of indoor air samples collected in July 1999 that determined no adverse impact from subsurface contamination. Cancer risks and noncancer hazards for current off-Property commercial workers potentially exposed to indoor air vapors in a commercial establishment located in a subterranean parking garage were evaluated and found to be below the target health goals of 1 x $10^{-5}$ and 1.0, respectively. Estimated cancer risks and noncancer hazards for current off-Property residents potentially exposed to indoor air vapors in a first-floor residence above a subterranean parking garage were below 1 x $10^{-6}$ and 1.0, respectively [GeoSyntec, 2004].

The results of the RA indicate that chlorinated VOCs and PCBs may pose an unacceptable health risk (greater than 1 x $10^{-6}$) under a future, upper-floor residential use scenario. In addition, PCE and PCBs may pose an unacceptable health risk (greater than $1 \times 10^{-5}$) to future on-Property landscapers and utility/trench workers. Therefore, the following potential future exposure pathways would require mitigation depending on the future land use of the Property:

- Inhalation of indoor air vapors from on-Property soils, soil vapor, and groundwater (hypothetical future residents, landscapers, utility/trench workers, and possibly off-Property commercial workers); and

- Incidental ingestion and dermal contact with on-Property shallow soils and inhalation of outdoor air fugitive dust/vapors (hypothetical future landscaper and utility/trench workers).

The results of the RA screening-level ecological assessment show that groundwater chemical concentrations were below the chronic screening criteria. This indicates that the current chemical concentrations at the leading edge of the groundwater plume would not adversely impact aquatic receptors. Therefore, there is currently no unacceptable ecological risk, as agreed by the DTSC upon approval of the RA.

2. Beneficial Uses of the Site Resources - HSC, Section 25356.1 (d) (2).

The closest groundwater production wells completed in the Silverado Aquifer within the Santa Monica Basin are two inactive well fields located approximately two miles north and northeast of the subject property, in an upgradient direction. The two well fields are the City of Santa Monica Arcadian Well Field and the Southern California Water Company Charnock Well Field. The wells within these two well fields have been shut down. The wells were shut down in 1996 and 1997 due to the presence of methyl tertiary butyl ether (MTBE) in the groundwater. Water formerly extracted from these fields contained detectable concentrations of VOCs, primarily TCE and PCE, which required well-head treatment to remove the contaminants prior to distribution to customers. The City of Santa Monica water supply Well No. SM-1 is located more than four miles north (upgradient) of the Property.

The Property is located in the Venice District of the Los Angeles, California on an approximately 1.4-acre lot located on the northeast side of Glencoe Avenue. The current Property configuration consists of a fenced parking area, a building structure, and landscaped frontage. The Property is bounded to the southwest by Glencoe Avenue, to the northwest by an alley and adjacent industrial property, to the northeast by vacant land, and to the southeast by additional light industrial/commercial buildings, paved parking, and storage areas.

The Property vicinity is in transition from light industrial and commercial use to mixed-use, consisting of commercial and multi-unit residential use. The redevelopment trend has accelerated dramatically in 2004-2005, with many demolition and redevelopment projects underway on Glencoe Avenue and on Redwood Avenue between Maxella Avenue to the south and W. Washington Boulevard to the north. This area encompasses the Property. Formerly, the Property vicinity was utilized primarily as a light commercial (including retail shops, gas stations, car rental centers, automobile repair shops, public parking lots, and restaurants) and residential area (including multi-story apartment complexes). There are no single-family residences along Glencoe Avenue or on the west side of Redwood Avenue in the Property vicinity. Southwest of the Property is a commercial shopping center, including a Gelson's Market and Sporting Goods store. Apartment complexes and residential homes are located to the west of the commercial and light industrial areas across from the Property.

The proposed cleanup alternative requires that a Deed Restriction be recorded in the County Recorder's Office. The Deed Restriction will set forth a description of the types, levels, and location of hazardous substances found at the Property. The document will also set forth certain use restrictions on the Property. The anticipated Deed Restriction would prohibit sensitive land uses (i.e., single family residence, hospitals, schools, or child-care centers), specify new building construction (i.e., first floor non-residential, upper floor residential, and inclusion of vapor control system), and prohibit on-Property groundwater extraction for municipal (i.e., drinking water), industrial and agricultural use.

Additionally, the Deed Restriction will prohibit certain categories of activities that may disturb other elements of the implemented remedy.

Specific operation and maintenance protocols will be incorporated into the Deed Restriction by reference to the Operations and Maintenance Agreement. The Property may be developed to the highest and best use, which likely will be commercial/residential mixed use. Such development may be possible anywhere on the 1.4 acre Property.

3. Effect of the Remedial Actions on Groundwater Resources - HSC, Section 25356.1 (d) (3)

The downgradient off-Property potential risk to receptors overlying the plume currently is insignificant. Following Source Zone remediation through the application of ERH, a declining trend is expected in downgradient groundwater VOC concentrations, resulting in even lower risk on Property and off Property. In the unlikely event that an increasing trend in groundwater VOC concentrations is observed over multiple monitoring events, that condition would be addressed through implementation of the contingency plan identified in Section 7.2.3 of the RAP: chemical oxidant (permanganate) would be injected into wells within or downgradient of the zone of treatment to reduce and manage concentrations. Further, if the footprint of the contaminant plume shifts, a contingency plan would be developed to assess off-Property risk and plume migration.

4. Property-Specific Characteristics - HSC, Section 25356.1 (d) (4)

Chemicals in soil and groundwater beneath the Site have been extensively characterized. Following completion of the remedy, the current off-Property migration of chemicals in soil vapor and groundwater will be mitigated. The dissolved-phase groundwater concentrations should decline, and the migration of soil vapor should decline as well.

The groundwater contamination at the Property is due to PCE and TCE. Cornell-Dubilier Electronics, Inc. (CDE) used TCE in its operations, but has no record of the use of PCE. It appears that the presence of PCE in the groundwater contamination is due to regional sources co-mingling with the groundwater contamination from the 4144 Glencoe property, or is due to releases on Property from parties other than CDE.

The soil and hydrostratigraphic conditions at the Site are as follows:

- Aquitard A (Bellflower aquitard) - occurs from ground surface to approximately 20 feet bgs and generally consists of unsaturated fine-grained materials, principally silt, clay and fine sand. Aquitard A is considered the vadose zone.

- Aquifer A (Ballona aquifer) – first groundwater occurs from about 20 to 30 feet bgs in strata consisting principally of sands and gravelly sands. The basal portion of Aquifer A is typically coarser grained than the upper portion. Aquitard B (fine-grained unit within Ballona aquifer) - generally occurs from 30 feet bgs to 35 feet bgs. However, Aquitard B is absent in the eastern portion of the Site and thickens to approximately 8 feet in the western portion of the Site. Aquitard B consists of silt and clayey silt.

- Aquifer B (Ballona aquifer) - generally occurs from 35 feet bgs to 52 feet bgs. Several thin (less than 2-foot-thick) fine-grained units occur within Aquifer B. During the RI, several CPT locations encountered contained coarse-grained sediments in Aquifer B that could not be penetrated.

- Aquitard C (unnamed aquitard separating Ballona and Silverado aquifers) - generally occurs from about 50 feet bgs to at least 60 feet bgs in the general Property vicinity. Aquitard C ranges in thickness from about 10 to 15 feet, and consists primarily of silt and clay.

- Aquifer C (Silverado aquifer) - occurs below 65 feet bgs and consists of fine to medium-grained sand. The Silverado aquifer is approximately 200 feet thick in the vicinity of the Site and the depth to its base is approximately 250 to 300 feet bgs.

5. Cost-Effectiveness of Alternative Remedial Action Measures - Section 25256.1 (d) (5)

The proposed remedial action alternative, Alternative 2: Selective Excavation and Electrical Resistive Heating, was not the most cost-effective alternative to meet the cleanup objectives. It is higher in cost than Alternative 3: Selective Excavation and In-Situ Chemical Oxidation.

6. Potential Environmental Impacts of Remedial Actions - Section 25356.1 (d) (6)

Potential impacts will be mitigated under the proposed remedial alternative. The proposed remedial alternative will not create any significant environmental impacts. Because of this, a Negative Declaration has been drafted pursuant to the California Environmental Quality Act (CEQA) for the proposed remedial alternative. An Environmental Study Checklist was completed for 4144 Glencoe Avenue which discussed potential environmental impacts of the proposed remedial alternative, as well as actions that will be taken to reduce or eliminate these potential environmental impacts during implementation. The CEQA Environmental Study Checklist and draft Negative Declaration were distributed for a 60-day public comment period.

# APPENDIX C

# NON-BINDING ALLOCATION OF RESPONSIBILITY

# APPENDIX C

## Preliminary Non-Binding Allocation of Responsibility for 4144 Glencoe Avenue

Health and Safety Code (HSC) section 25356.1(e) requires the Department of Toxic Substances Control (DTSC) to prepare a preliminary nonbinding allocation of responsibility (the "NBAR") among all identifiable potentially responsible parties (PRPs). HSC section 25356.3(a) allows PRPs with an aggregate allocation in excess of 50% to convene an arbitration proceeding by submitting to binding arbitration before an arbitration panel. The sole purpose of the NBAR is to establish which PRPs will have an aggregate allocation in excess of 50% and can therefore convene arbitration if they so choose. The NBAR, which is based on the evidence presently available to the DTSC, is not binding on anyone, including PRPs listed herein, DTSC, or the arbitration panel. Once arbitration is convened, or waived, the NBAR has no further effect, in arbitration, litigation or any other proceeding, except that both the NBAR and the arbitration panel's allocation are only admissible in a court of law, pursuant to HSC section 25356.7 for the purpose of showing the good faith of the parties who have discharged the arbitration panel's decision.

The 4144 Glencoe Avenue Site (the “Site”) is currently in litigation concerning the cleanup responsibilities of one of the identified PRPs, Cornell-Dubilier Electronics, Inc. (“CDE”). CDE has been actively investigating the Site, including preparing Remedial Investigations and a Risk Assessment, both of which have been approved by the DTSC, a draft Feasibility Study (“FS”), and a Draft Remedial Action Plan. CDE has also paid the oversight costs of the DTSC and has indicated that it intends to implement the preferred alternative remedy identified in the draft FS. Accordingly, the DTSC has not yet sought to recover any costs from other potentially responsible parties.

Although CDE operated the Site from approximately 1955 to 1971, several other parties have owned or operated the Site since that time. Information about these owners and operators is incomplete in some instances. According to the available information, Zenith Processing Corp. (“Zenith”) operated at the Site from approximately 1972 to 1984 and may have used solvents such as perchloroethylene, a contaminant of concern at the Site. Zenith also owned the site for some period of time in 1984. During some of this period, a portion of the Site was occupied by the Ingenuity Tool Company. Ingenuity Tool Company’s exact operations are unknown. The property was thereafter sold to Antoinette and Herbert Searles (the “Searles”). Title was ultimately transferred to another entity, Brian Catalde Developments, Inc. Currently, the Site is owned by Glencoe Properties, LLC. A related entity, Parr-Bohn Properties, Ltd. II, first acquired an interest in the Site in 1985, when it issued a promissory note to the Searles secured by the property. Glencoe Properties, LLC acquired the Site outright in 1999 following an assignment by Parr-Bohn Properties, Ltd. II of the Deed of Trust and a foreclosure.

Based upon the presently available information, DTSC sets forth the following preliminary NBAR for the Site:

- CDE is allocated 50% responsibility; and

- The following other current or former owners or operators of the Site are collectively allocated 50% responsibility: Zenith Processing Corp., Antoinette and Herbert Searles, Brian Catalde Developments, Inc., Ingenuity Tool Company, Parr-Bohn Properties Ltd II, Glencoe Properties, LLC.

# APPENDIX D

# CEQA DOCUMENTS

# NEGATIVE DECLARATION

**Submitting:** ☒ **Draft**
☐ **Final**
☐ **Mitigated Negative Declaration**

Project Title: Cornell Dubilier Electronics/ 4144 Glencoe Avenue Site

State Clearinghouse Number: ______

Contact Person: Ryan Kinsella, Project Manager Phone # (818) 551-2961

Project Location (*Include County*):

The Site is located in the County of Los Angeles, Venice District of the City of Los Angeles, California. The Site address is 4144 Glencoe Avenue, 90292

Project Description:

The Department of Toxic Substances Control (DTSC) is considering approval of a Draft Remedial Action Plan (RAP) for the 4144 Glencoe Avenue Site (Site) pursuant to authority granted under Chapter 6.8, Division 20, California Health & Safety Code (H&SC). The Site is contaminated with polychlorinated biphenyls (PCBs), tetrachloroethene (PCE), and trichloroethylene (TCE). The Draft RAP includes a remedy consisting of Selective Soil Excavation and Electrical Resistive Heating, followed by groundwater monitoring. A deed restriction will accompany the remedy. This Initial Study (IS) has been prepared in accordance with California Environmental Quality Act (CEQA) Statutes and Guidelines. The DTSC is acting as the lead agency for CEQA approvals.

Findings of Significant Effect on Environment:

The Site is located in the Venice district in the City of Los Angeles. The remedial activities are a short-term project. As the Initial Study indicates, the project activities will not have a significant potential to degrade the quality of the environment. It will not reduce habitat of fish or wildlife species. It will not threaten or eliminate plants or animals in the community, restrict the range of rare or endangered plants or animals, nor eliminate important periods of California history or prehistory.

*Finding*

Based on the explanation and supporting evidence provided above, DTSC finds that the project will have no potential for adverse effect, either individually or cumulatively on fish and wildlife, or the habitat on which it depends, as defined by section 711.2 of the Fish and Game Code.

Sayareh Amir 10-14-05

DTSC Branch Chief Signature Date

| DTSC Branch Chief Name | DTSC Branch Chief Title | Phone # |
|---|---|---|
| Sayareh Amir | Chief, Southern California Cleanup Ops-Glendale | ( 818 ) 551-2822 |

# CERTIFICATE OF EXEMPTION FROM DEPARTMENT OF FISH & GAME FILING FEE

## FINDING OF DE MINIMIS IMPACT

Project Title: Cornell Dubilier Electronics/ 4144 Glencoe Avenue Site

State Clearinghouse Number: ______________________

Contact Person: Ryan Kinsella, Project Manager Phone # (818) 551-2961

Project Location (*Include County*):
The Site is located in the County of Los Angeles, Venice District of the City of Los Angeles, California. The Site address is 4144 Glencoe Avenue, 90292

Project Description:
The Department of Toxic Substances Control (DTSC) is considering approval of a Draft Remedial Action Plan (RAP) for the 4144 Glencoe Avenue Site (Site) pursuant to authority granted under Chapter 6.8, Division 20, California Health & Safety Code (H&SC). The Site is contaminated with polychlorinated biphenyls (PCBs), tetrachloroethene (PCE), and trichloroethylene (TCE). The Draft RAP includes a remedy consisting of Selective Soil Excavation and Electrical Resistive Heating, followed by groundwater monitoring. A deed restriction will accompany the remedy. This Initial Study (IS) has been prepared in accordance with California Environmental Quality Act (CEQA) Statutes and Guidelines. The DTSC is acting as the lead agency for CEQA approvals.

Findings of Exemption:

The Department of Toxic Substances Control (DTSC) prepared an Initial Study pursuant to the California Environmental Quality Act[1] and implementing Guidelines[2] that evaluated the proposed project for the potential for adverse environmental impact. Considering the record as a whole, there is no evidence before DTSC that the proposed project will have potential for an adverse effect on wildlife resources or the habitat upon which the wildlife depend.

Findings supporting this declaration are contained in Section V. Finding of De Minimis Impact to Fish, Wildlife and Habitat of the Initial Study. This section, and any other portions of the Initial Study it references, is attached.

Certification:

DTSC certifies that the evidence contained in the record supporting the findings herein are true and accurate and declares that it has, on the basis of substantial evidence, rebutted the presumption of adverse effect contained in title 14, California Code of Regulations, section 753.5(c).

Sayareh Amir 10-14-05

DTSC Branch Chief Signature Date

Sayareh Amir | Chief, Southern California Cleanup Ops-Glendale | ( 818 ) 551-2822

[1] Public Resources Code § 21000 et seq.
[2] Title 14, California Code of Regulations, Division 6, Chapter 3, §15000 et seq.

Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

1011 North Grandview Avenue
Glendale, California 91201

Arnold Schwarzenegger
Governor

# INITIAL STUDY
# FOR
# DRAFT REMEDIAL ACTION PLAN
# CORNELL DUBILIER ELECTRONICS/
# 4144 GLENCOE AVENUE SITE
# LOS ANGELES, CALIFORNIA 90292

**October 2005**

**Prepared by:**

**California Environmental Protection Agency**
**Department of Toxic Substances Control**
**Site Mitigation and Brownfields Reuse Program**
**Southern California Cleanup Operations- Glendale**
**1011 North Grandview Avenue**
**Glendale, California 91201**

TABLE OF CONTENTS

## Attachments



## List of Figures

# INITIAL STUDY

*The Department of Toxic Substances Control (DTSC) has completed the following Initial Study for this project in accordance with the California Environmental Quality Act (§ 21000 et seq., California Public Resources Code) and implementing Guidelines (§15000 et seq., Title 14, California Code of Regulations).*

---

## *I. PROJECT INFORMATION*

Project Name: Cornell-Dubilier Electronics/ 4144 Glencoe Avenue Site

Site Address: 4144 Glencoe Avenue

City: Los Angeles State: CA Zip Code: 90292 County: Los Angeles

Company Contact Person: Mr. Curtis L. Lopes

Address: 1605 Rodney French Blvd.

City: New Bedford State: MA Zip Code: 02744 Phone Number: (508) 996-8561

**Project Description**: The Department of Toxic Substances Control (DTSC) is considering approval of a Draft Remedial Action Plan (RAP) for the 4144 Glencoe Avenue Site (Site) pursuant to authority granted under Chapter 6.8, Division 20, California Health & Safety Code (H&SC). The Site is located in the Venice District of Los Angeles, California. The Site is contaminated with polychlorinated biphenyls (PCBs), tetrachloroethene (PCE), and trichloroethylene (TCE). The Draft RAP includes a remedy consisting of Selective Soil Excavation and Electrical Resistive Heating, followed by groundwater monitoring. A deed restriction will accompany the remedy. This Initial Study (IS) has been prepared in accordance with California Environmental Quality Act (CEQA) Statutes and Guidelines. The DTSC is acting as the lead agency for CEQA approvals.

**Project Activities***:* The activities associated with the Draft RAP include Selective Soil Excavation of approximately 900 cubic yards of soil and Electrical Resistive Heating. The activites associated with the alternative are:

- Excavation of impacted soil (PCBs > 17ppm) via shallow soil excavation to a depth of 10 feet below ground surface (bgs);
- Excavation of impacted soil in the source zone via auger excavation to a depth of 20 feet bgs; and
- Installation of an Electrical Resistive Heating system within the source zone, targeted at treating the area from the ground surface to 50 feet bgs.

Additional items are also included to complement this alternative:

- Institutional controls such as a deed restriction;
- Engineered controls such as a vapor control barrier for proposed new construction;
- Groundwater monitoring to monitor dissolved-phase plume stability; and
- Post-remedy baseline soil vapor sampling.

The location, description, and configuration of these components are illustrated in several figures that are contained in the Draft RAP: Figure 6-2, Shallow Soil and Auger Excavation Schematic; Figure 7-1, Electrical Resistive Heating and Auger Excavation Schematic; Figure 7-2, Electrical Resistive Heating and Auger Excavation Profile; Figure 7-3, General Plan View Schematic for Electrical Resistive Heating; and Figure 7-4, General Cross Section Schematic for Electrical Resistive Heating.

The selective soil excavation includes two components: shallow soil excavation and soil column excavation via auger. The shallow soil excavation will utilize typical construction equipment associated with excavation activities. The soil column excavation will use a specialized auger to remove a specific column of soil that is approximately 20 feet in diameter. Both soil excavation methods include the following activities:

- Clear and grub the Site of remaining vegetation and debris;
- Excavate approximately 900 cubic yards of soils that contain chemicals of concern at concentrations that exceed cleanup criteria;
- Transport approximately 100-150 truck loads of soils containing constituents above cleanup criteria off-site to an approved landfill for disposal;
- Import soils for backfill of the excavation;
- Compact and grade the Site to desired finish grade; and
- Repave the Site.

The electrical resistive heating system consists of several components, some of which will be installed in the subsurface. The electrical resistive heating system components will include:

- Electrodes embedded into the subsurface to transmit electricity;
- Soil vapor extraction system consisting of both subterranean and above ground components (condenser, knockout box, granular activated carbon) to treat off-gas and condensate; and
- Sentry wells for assessing whether contaminants are being mobilized during remediation; and
- Confirmation sampling.

Vapor control barriers are proposed under new construction at the Site to mitigate the potential risk for hypothetical future on-site receptors. The remedy has been designed to accommodate future Site construction with slab on grade construction or first floor parking with an underlying vapor control system comprising a geocomposite vapor barrier under the concrete slab, an air inlet, a vapor outlet, and vapor monitoring points consistent with current building practice. The description and configuration of the vapor control barrier is illustrated in Figure 7-5 in the Draft RAP.

## II. DISCRETIONARY APPROVAL ACTION BEING CONSIDERED BY DTSC

| | | |
|---|---|---|
| ☐ Initial Permit Issuance | ☐ Closure Plan | ☐ Removal Action Workplan |
| ☐ Permit Renewal | ☐ Regulations | ☐ Interim Removal |
| ☐ Permit Modification | ☒ Remedial Action Plan | ☐ Other (Specify) |

Program/ Region Approving Project: Site Mitigation and Brownfields Reuse Program/ Southern California Cleanup Operations- Region 3 (Glendale)

DTSC Contact Person: Mr. Ryan Kinsella

Address: 1011 North Grandview Avenue

City: Glendale State: CA Zip Code: 91201 Phone Number: (818) 551-2961

## III. ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

The boxes checked below identify environmental resources in the following ENVIRONMENTAL SETTING/IMPACT ANALYSIS section found to be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact."

| | | |
|---|---|---|
| ☒ None Identified | ☐ Aesthetics | ☐ Agricultural Resources |
| ☐ Air Quality | ☐ Biological Resources | ☐ Cultural Resources |
| ☐ Geology And Soils | ☐ Hazards and Hazardous Materials | ☐ Hydrology and Water Quality |
| ☐ Land Use and Planning | ☐ Mineral Resources | ☐ Noise |

☐ Population and Housing ☐ Public Services ☐ Recreation

☐ Transportation and Traffic ☐ Utilities and Service Systems

## IV. ENVIRONMENTAL IMPACT ANALYSIS

The following pages provide a brief description of the physical environmental resources that exist within the area affected by the proposed project and an analysis of whether or not those resources will be potentially impacted by the proposed project. Preparation of this section follows guidance provided in DTSC's California Environmental Quality Act Initial Study Workbook [Workbook]. A list of references used to support the following discussion and analysis are contained in Attachment A and are referenced within each section below.

Mitigation measures which are made a part of the project (e.g.: permit condition) or which are required under a separate Mitigation Measure Monitoring or Reporting Plan which either avoid or reduce impacts to a level of insignificance are identified in the analysis within each section.

### 1. Aesthetics

***Project activities likely to create an impact:*** None. The Site is located in the Venice district in Los Angeles, California on an approximately 1.4-acre lot located on the northeast side of Glencoe Avenue. The current property configuration consists of a fenced parking area, a building, structure, and landscaped frontage. The Site is bounded to the southwest by Glencoe Avenue, to the northwest by an alley and adjacent industrial property, and to the northeast and southeast by additional light industrial buildings, paved parking, and storage areas.

No project activities are expected to significantly alter the appearance of the Site. The excavated areas will be backfilled with clean, imported fill. Appropriate areas of the Site will be repaved. The construction phase of soil excavation could have a short term effect on aesthetics due to the equipment that will be used to excavate soil and remove and transport contaminated soil from the Site. However, once work is completed all heavy equipment will be removed from the Site and the Site will be returned to original conditions (i.e., original grade and repaved).

The electrical resistive heating system will be installed entirely in the subsurface except for a 10-foot by 10-foot shed that will house the aboveground treatment system for off-gas and condensate. This shed will not be located in a high-trafficked area of the Site. When complete, the electrical resistive heating system components will be removed, and the Site returned to original conditions.

Installation of a vapor barrier system would occur in conjunction with new construction and would not alter the appearance of the Site.

***Description of Environmental Setting***:

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Have a substantial adverse effect on a scenic vista.

The soil excavation phase of construction will have a temporary effect on the scenic vista with the presence of large equipment, such as earthmovers, augers, and trucks. The excavation activities will be completed in approximately one month. The presence of specialized construction equipment will also be necessary to complete the installation of the electrical resistive heating system, which is anticipated to take approximately two weeks. Once treatment is completed, the only visual part of the system will be the shed, housing the above ground components of the SVE system that will be located away from high-trafficked areas of the Site. The total duration of construction activities (i.e., excavation and electrical resistive heating installation) is estimated to be 1½ to 2 months.

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings and historic buildings within a state scenic highway.

None. The Site vicinity is in transition from light industrial and commercial use to mixed-use, consisting of commercial and residential use. Therefore, activities at the Site would not degrade scenic resources. However, the list of scenic highways posted on the Caltrans website was checked, and the nearest scenic highway identified was the Pacific Coast Highway (Route 1).

The Pacific Coast Highway cuts inland and travels east in the vicinity of the Site, and at that location, is no longer categorized as a scenic highway. Regardless, associated Site activities would not be observed if traveling along that route.

c. Substantially degrade the existing visual character or quality of the site and its surroundings.

As stated previously, the Site is located in a light industrial and commercial area. The excavated areas will be backfilled and returned to original condition. The only visible components associated with the project activities would be the aboveground components of the electrical resistive heating system. These components would be housed in a 10 foot by 10 foot shed that will not be located in any high-trafficked areas of the Site, and should not in any way degrade the visual character or quality of the Site. The activity on Site would be similar to the construction activity that has been occurring in the area.

d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

None. The project activities will not create a new source of substantial light or glare, and will not be conducted at night.

***Specific References (List a, b, c, etc)*:**

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- Caltrans website on scenic highways: http://www.dot.ca.gov/hq/LandArch/scenic_highways/scenic_hwy.htm

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 2. Agricultural Resources

***Project activities likely to create an impact*:** None. The Site is not currently being used for agricultural purposes, or classified as an agricultural setting. The implementation of the remedy is not proposed in an area that is suitable for agricultural use.

***Description of Environmental Setting*:**

The Site vicinity is in transition from light industrial and commercial use to mixed-use, consisting of commercial and residential use. It is not anticipated that the Site can be or will be used for agriculture activities. In addition, the Site does not lie in or around any land designated as 'Important Farmland in California'. Therefore, no further analysis is necessary.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

b. Conflict with existing zoning or agriculture use, or Williamson Act contract.

c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.

***Specific References (list a, b, c, etc)*:**

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- Department of Conservation: http://www.consrv.ca.gov/dlrp/index.htm

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 3. Air Quality

***Project activities likely to create an impact***: Emissions from construction equipment, truck loads, and fugitive dust from excavation activities.

***Description of Environmental Setting***:

The 4144 Glencoe Avenue Site lies near the western boundary of the South Coast Air Basin (SCAB), which consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, as well as all of Orange County. The SCAB is generally characterized as having a mild climate with cool breezes, occasionally interrupted by periods of hot weather, winter storms, or Santa Ana winds.

Annual precipitation in the SCAB varies considerably, but averages less than 15 inches per year, with 80% occurring from December through March. Average wind speed is very light, and the dilution of air contaminants is generally slow. Winds in the vicinity of the facility predominantly flow from the west to the east.

Temperature inversions also occur frequently in the SCAB and restrict vertical dispersion of air contaminants. The climate, combined with the topography of Southern California, make the SCAB an area of high air pollution potential. The SCAB exceeds the federal ozone standard more frequently than any other area of the United States. The number of days the federal ozone standard is exceeded is decreasing.

The sources of air contaminants in the SCAB vary by pollutant, but generally include on-road mobile sources (i.e., cars, trucks, and buses), other mobile sources (i.e, construction equipment, trains, ships, planes, etc.), residential and commercial sources, and industrial/manufacturing sources. Mobile sources are responsible for much of the total SCAB emissions of severe pollutants (i.e., NOx, CO, and VOCs).

Local air quality in the SCAB is monitored by the South Coast Air Quality Management District (SCAQMD) and compared to state and federal ambient air quality standards. Air quality standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (PM10 and PM2.5), and lead have been set by both the California state and federal governments. The state has set standards for sulfate and visibility. The standards and the conditions in the SCAB are summarized below:

| Pollutant | Units | California standard | Federal standard | Exceeded standards |
|---|---|---|---|---|
| Ozone | ppm | **0.09** (1 hour) | **0.12** (1 hour), **0.08** (8 hours) | Yes |
| Carbon monoxide | ppm | **9.0** (8 hours) | **9.5** (8 hours) | Yes (1 day)* |
| Nitrogen dioxide | ppm | **0.25** (1 hour) | **0.0534** (annual arithmetic mean-AAM) | Yes (1 day) |
| Sulfur dioxide | ppm | **0.25** (1 hour), **0.04** (24 hours) | **0.50**(3 hour), **0.04**(24 hours), **0.03**(AAM) | No |
| PM10 | $\mu g/m^3$ | **50** (24 hours) | **150** (24 hours) | Yes |
| PM2.5 | $\mu g/m^3$ | **12** (24 hour) | **65** (24 hour) | Yes |
| Lead | $\mu g/m^3$ | **1.5** (monthly average) | **1.5** (quarterly average) | No |
| Sulfate | $\mu g/m^3$ | **25** (24 hour) | **Not available** | No |

* SCAB technically met the carbon dioxide threshold for attainment in 2002 and is applying for reclassification.

The Clean Air Act requires ozone non-attainment areas, like the South Coast, to prepare plans that meet emission reduction progress requirements and provide for expeditious attainment of the federal ozone standard. The District has revised their South Coast Air Quality Management Plan (AQMP) which accelerates the schedule for adopting and implementing existing and stringent new control measures to meet the federally approved ozone State Implementation

Plan (SIP). The AQMP ozone control measures will regulate and reduce ozone by stringent controls of hydrocarbon emissions from various existing and new sources in the SCAB.

A brief preliminary analysis air quality in the South Coast Air Basin (SCAB) has been performed based on the most recent available data for 2002. During 2002, maximum pollutant concentrations recorded in the SCAB exceeded state and federal standards for ozone, carbon monoxide, nitrogen dioxide, and PM10. For the stations in the vicinity of the site (Riverside and Orange County), ozone and PM10 federal and state standards were exceeded in 2002.

SCAQMD rules/requirements that are applicable to this project include: Rules 401, 402, 403, 1166, and Permit to Construct and Permit to Operate.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Conflict with or obstruct implementation of the applicable air quality plan.

Construction and remedy operation will be performed subject to SCAQMD conditions. Those conditions, which will govern project activities, will be specified so that the project activities do not conflict or obstruct the air quality plan.

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

During construction, air emissions will be generated from the trucks excavating impacted soils. Air emissions will primarily be diesel engine exhaust emissions. Modest short-term impacts would include increased dust from construction and truck traffic. Actual field work will likely be completed in a period of 30 to 60 days. The proposed project will require the importation to the site of approximately 100 – 150 truck loads of material over a two to three-week period. The daily truck traffic would range 10 to 15 vehicles. The Site is located in an industrial setting, and near the Marina Freeway (State Route 90) and Interstate 405. Air emissions from vehicles on these freeways may contribute to a much higher percentage than would the daily truck traffic to the site. The least used roads by residents will be routed for truck traffic to minimize any increase in traffic, or air emissions close to the nearby residents.

The SCAQMD has established the following thresholds for fugitive dust and particulates: "no visible dust in the atmosphere beyond the property line of the emission source," and "no exceedance of PM10 levels over 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samples." Preventive measures include removal within one hour the track-out of bulk material onto public paved roadways, applying water to disturbed surface areas, applying chemical stabilizers to disturbed areas, or discontinuing operations during periods of high wind.

Photochemically reactive hydrocarbons, the cause of ozone, are often referred to as volatile organic compounds or VOCs. VOCs are stringently regulated by the SCAQMD as part of their AQMP and in compliance with the goals of the SIP. VOC emissions are reduced by thermal destruction (flares, oxidizers and sometimes as fuel in internal combustion engines) or adsorbed onto media such as activated carbon.

Carbon monoxide emissions are usually controlled and regulated during vehicle manufacturing standards and also through smog check, being enforced by SCAQMD. Moreover, the background level of carbon monoxide that is emitted from the Marina Freeway (State Route 90) and Interstate 405 is much higher than the regular use for the project site.

Requirements from the SCAQMD will be followed. Prior to obtaining required permits, fugitive dust emissions will be estimated using SCAQMD procedures. The subsequent permit limits will be monitored on the Site and its perimeter during construction activities. The permit conditions will be monitored by the SCAQMD through their on-site inspection process. Perimeter monitoring will be required for the air monitoring program at the Site. An environmental contractor capable of performing these tasks will be on Site to conduct the monitoring. It is not anticipated that the use of heavy equipment and diesel trucks will cause any significant deterioration to the air quality.

c. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Required permits will contain conditions regarding non-attainment criteria pollutants.

d. Expose sensitive receptors to substantial pollutant concentrations.

Since the Site is located in an industrial area, the increase in air emissions from the trucks will not be significant. Truck traffic will be routed onto the roads which are least used by residents to minimize any increase in traffic or air emissions close to the nearby residents.

A deed restriction will be placed at the Site which will restrict future use of the property.

e. Create objectionable odors affecting a substantial number of people.

See responses to section C above. Additionally, SCAQMD requirements during construction will limit the emissions of compounds associated with objectionable odors.

f. Result in human exposure to Naturally Occurring Asbestos (see also Geology and Soils, f.).

The proposed project would not result in human exposure to naturally occurring asbestos and not result in human exposure to Naturally Occurring Asbestos.

***Specific References (list a, b, c, etc)***:

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- South Coast Air Quality Management District 2002, Air Quality Standards Compliance Report.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 4. Biological Resources

***Project activities likely to create an impact***: None. The project activities are not likely to create an impact to biological resources at the Site. The activities will occur in the parking lot of the Site, where approximately 900 cubic yards of soil will be excavated and replaced with clean soil.

***Description of Environmental Setting***:

The Site is located in an urban habitat, where no natural flora or fauna as well as other biological resources exist, or will be disturbed. A Natural Diversity Database search was conducted and no species, habitat, or wetlands were identified in the Database.

The Ballona Wetlands are located approximately ¾-mile south of the Site, however the Site is completely surrounded by an urban environment and project activities are not expected to impact the Wetlands in any way. Site contaminants are not expected to reach the wetlands in any medium (soil or groundwater). The Ballona Wetlands once encompassed an area of over 2,000 acres covering much of today's Venice, Marina del Rey and parts of West Los Angeles. Over the years the wetlands have been degraded and reduced to less than 190 acres. The Ballona Wetlands are currently being restored and are planned to increase the wetland habitat to 249.6 acres plus an additional 99.5 acres of native terrestrial habitat (dunes, scrub, transitional freshwater marsh, transitional saltmarsh, native grassland and a plant nursery) for a total of approximately 340 acres.

The Ballona Wetlands Land Trust website contains listed species that are protected by the Endangered Species Act (ESA). The list includes: American Peregrine Falcon, Peregrine Falcon, Brown Pelican, Coastal California Gnatcatcher, California Least Tern, Least Bell's Vireo, Light-Footed Clapper Rail, Southwestern Willow Flycatcher, Western Snowy Plover, California Red-Legged Frog, Pacific Pocket Mouse, Unarmored Threespine Stickleback, Arroyo Southwestern Toad, El Segundo Blue Butterfly, San Diego Fairy Shrimp, Riverside Fairy Shrimp, Quino Checkerspot Butterfly, Tidewater Goby, and Saltmarsh Bird's Beak. Since Site contaminants will not reach the Ballona Wetlands, none of these endangered species will be affected by the project activities. Therefore, no further analysis is necessary. After completing a Natural Diversity Database search , it was determined that no endangered species will be affected, and project activities including excavation of 900 cubic yards of impacted soil, trucks used to haul soil away from and to the Site, and installation of an Electrical Resistive Heating and Soil Vapor Extraction system within the source zone, will not cause a significant impact.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

   No Impact- No species, habitat, or wetlands were identified in the Natural Diversity Database.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

   No Impact- No species, habitat, or wetlands were identified in the Natural Diversity Database.

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

   No Impact- No species, habitat, or wetlands were identified in the Natural Diversity Database.

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

   No Impact- No species, habitat, or wetlands were identified in the Natural Diversity Database.

e. Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

   No Impact- Site is located in an urban habitat, where no natural flora or fauna or other biological resources exist

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

   No Impact- Site is located in an urban habitat, where no natural flora or fauna or other biological resources exist

***Specific References (list a, b, c, etc):***

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- U.S. Fish and Wildlife: http://www.fws.gov/
- Department of Fish and Game: http://www.dfg.ca.gov/
- Ballona Wetlands Land Trust Webpage: http://www.ballona.org/
- Ballona Wetlands Foundation: http://www.ballona-wetlands.org/
- California Natural Diversity Database, Wildlife & Habitat Data Analysis Branch, Department of Fish and Game, September 2, 2005 (Version Date)

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 5. Cultural Resources

***Project activities likely to create an impact***: None. The Site is not located within a designated historical district, and, is not considered to have any special cultural, historical, or scientific value. Therefore, no further analysis is necessary.

***Description of Environmental Setting***:

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5.

No Impact- Site is not considered to have any special cultural, historical, or scientific value

b. Cause a substantial adverse change in the significance of an archeological resource pursuant to 15064.5.

No Impact- Site is not considered to have any special cultural, historical, or scientific value

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

No Impact- Site is not considered to have any special cultural, historical, or scientific value

d. Disturb any human remains, including those interred outside of formal cemeteries.

No Impact- Site is not considered to have any special cultural, historical, or scientific value

***Specific References (list a, b, c, etc)***:

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- Office of Historic Preservation: http://ohp.parks.ca.gov

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 6. Geology and Soils

***Project activities likely to create an impact***: None.

***Description of Environmental Setting***:

The 4144 Glencoe Avenue Site is located in the Venice district in Los Angeles, California on an approximately 1.4-acre lot located on the northeast side of Glencoe Avenue. The current property configuration consists of a fenced parking area, a building, structure, and landscaped frontage. The Site is bounded to the southwest by Glencoe Avenue, to the northwest by an alley and adjacent industrial property, and to the northeast and southeast by additional light industrial buildings, paved parking, and storage areas.

The Site is located in the Santa Monica Groundwater Basin (SMGB) which underlies the Coastal Plain of Los Angeles

County. The Coastal Plain is a downwarped structural basin filled with sediments up to 13,000 ft thick. Four distinct groundwater basins underlie the Coastal Plain, including the Santa Monica Basin, the Hollywood Basin, the West Coast Basin, and the Central Basin. The portion of the Coastal Plain overlying the SMGB can be subdivided into six subareas, including the Santa Monica Plain, the Sawtelle Plain, the Ocean Park Plain, the Beverly Hills, the Baldwin Hills, and the Ballona Gap. The Site is located in the Ballona Gap subarea [URS, 2004a].

The SMGB is bordered by the Santa Monica Mountains on the north and the Ballona Escarpment on the south. The SMGB extends eastward from the Pacific Ocean to the Newport-Inglewood fault zone. The unconsolidated sediments within the SMGB are recent alluvium, the Upper Pleistocene Lakewood Formation, and the Lower Pleistocene San Pedro Formation. Underlying the San Pedro Formation is the consolidated Pliocene Pico Formation. The base of the fresh-water-bearing sediments is reported as several hundred feet below the top of the Pico Formation [URS, 2004a].

Contacts with DTSC, the Regional Water Quality Control Board (RWQCB), and CDWR staff indicate that the 1961 CDWR study of the Coastal Plain and its underlying groundwater basins and a study by the U.S. Geological Survey in 1959 [Poland et al., 1959] are the most recent comprehensive studies of the regional hydrogeology in the area. More recent studies have been smaller in scope and related to specific sites [URS, 2004a].

The CDWR reports that the unconsolidated sediments in the general vicinity of the Site are generally 250 to 300 ft thick. Beginning at the land surface, these unconsolidated sediments include in descending order: the Bellflower Aquitard; the Ballona Aquifer; an unnamed aquitard; and the Silverado Aquifer.

The understanding of the local hydrogeology was developed based on review of available regional geologic reports such as Poland et al. [1959] and CDWR [1961], as well as logs from the numerous soil borings and cone penetrometer tests (CPTs) completed as part of the Site RI. In addition to the numerous borings advanced between the mid-1980s and 2000, URS advanced 31 CPT probes to depths of 73 ft bgs and advanced three mud-rotary boreholes to depths of 90 ft bgs. Results of these assessments indicate that the local stratigraphy consists of alternating permeable zones (sand and gravel) and less permeable zones (silt and clay) to depths of at least 90 ft bgs. In general, the stratigraphy encountered in the CPT and mud-rotary boreholes is consistent with the regional hydrostratigraphy. Observations and nomenclature used for the local hydrostratigraphic units are presented in the following bullets. The interpreted regional hydrostratigraphic unit nomenclature is indicated in parentheses [URS, 2004a].

- Aquitard A (Bellflower Aquitard) - occurs from ground surface to approximately 20 ft bgs and generally consists of unsaturated fine-grained materials, principally silt, clay and fine sand. Aquitard A is considered the vadose (unsaturated) zone.

- Aquifer A (Ballona Aquifer) – first groundwater occurs from about 20 to 30 ft bgs in strata consisting principally of sands and gravelly sands. The basal portion of Aquifer A is typically coarser grained than the upper portion.

- Aquitard B (fine-grained unit within Ballona Aquifer) - generally occurs from 30 ft bgs to 35 ft bgs. However, Aquitard B is absent in the eastern portion of the Site and thickens to approximately 8 ft in the western portion of the Site. Aquitard B consists of silt and clayey silt.

- Aquifer B (Ballona Aquifer) - generally occurs from 35 ft bgs to 52 ft bgs. Several thin (less than 2 ft thick) fine-grained units occur within Aquifer B. During the RI, several CPT locations encountered contained coarse-grained sediments in Aquifer B that could not be penetrated.

- Aquitard C (unnamed aquitard separating Ballona Aquifer and Silverado Aquifer) - generally occurs from about 50 ft bgs to at least 60 ft bgs in the general Site vicinity. Aquitard C ranges in thickness from about 10 to 15 ft and consists primarily of silt and clay.

- Aquifer C (Silverado Aquifer) - occurs below 65 ft bgs and consists of fine to medium-grained sand. Aquifer C is approximately 200 ft thick in the vicinity of the Site, and the depth to its base is approximately 250 to 300 ft bgs.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

The excavation activities will be conducted to a depth of 10 feet bgs in the shallow excavation, and to 20 feet bgs in the auger excavation footprint. Excavation activities will be employed in a safe manner (i.e., sides will be sloped). After excavation of impacted areas, imported clean soil will be brought in to the Site and used as backfill. Any grading at the Site would be to return the topography to existing grade. If a grading permit is required, it will be obtained from the City of Los Angeles.

- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42).

  The principle seismic hazards at the Site would be ground shaking and rupture. The project involves grading and surface modifications to limited depths. It does not include construction of structures that would be impacted by seismic activity.

- Strong seismic ground shaking.

  The project involves surficial soil modifications and compaction. Even though hazard from seismic shaking cannot be totally eliminated, the soil modification activities will not increase the risk of injuries in case of strong seismic ground shaking.

- Seismic-related ground failure, including liquefaction.

  The proposed project activities will not expose people or structures to the effects of strong seismic ground shaking. However, the hazards from seismic shaking cannot be totally eliminated in the Los Angeles area.

- Landslides.

  Landslides are not of concern. The project activities will not result in unstable earth conditions or changes to the geologic substructures. Additionally, Site topography, which is relatively flat, will not be substantially changed by project activities. Slope stability is thereby not anticipated to be a concern.

b. Result in substantial soil erosion or the loss of topsoil.

Currently, the Site is paved, does not experience erosion, and is relatively flat. Project activities will include repaving the Site after excavation.

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

Based on the Remedial Investigation activities for the Site, the Site is not located on a geologic unit that is unstable, or that would become unstable as a result of the project, and potentially result in an on Site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Site geologic reports indicate that Site soils are not expansive.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.

The Site does not contain any septic tank and no septic tanks are located near the Site. No septic tanks or alternative wastewater disposal systems are located on the Site, nor have any such devices been proposed as part of this project.

f. Be located in an area containing naturally occurring asbestos (see also Air Quality, f.).

The proposed project would not result in human exposure to Naturally Occurring Asbestos.

**Specific References (list a, b, c, etc):**

- URS 2004, Groundwater Remedial Investigation Report.
- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- California Department of Water Resources 1961, Planned Utilization of the Ground Water Basins of Los Angeles County.
- Poland et al. 1959, Geology, Hydrology and Chemical Character of Ground Waters in the Torrance-Santa Monica Area.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 7. Hazards and Hazardous Materials

***Project activities likely to create an impact*:**

Project activities will include excavation of 900 cubic yards of impacted soil, trucks will haul impacted soil away from and clean soil to the Site, and Electrical Resistive Heating and Soil Vapor Extraction (SVE) systems will be installed within the source zone. Contact with the impacted soil during excavation, subsequent handling and transportation of soils, and contact with untreated soil vapor could also create impacts to workers or people or the environment in the surrounding community. Proper protective equipment will be used when working on or near the excavated soil to reduce the potential for contact. Truck trailers containing impacted soils will be covered to reduce the potential of receptors in the community from being exposed. The SVE system will be connected to a series of carbon canisters to treat vapors to reduce the risk of worker or community exposure. Excavation of impacted areas will be conducted in a manner as to mitigate spreading of the impacted soil

***Description of Environmental Setting*:**

Soils containing PCBs, TCE, and PCE were found at the Site. Previous environmental investigations have indicated that a total of approximately 900 cubic yards (cy) will be removed during shallow soil excavation and 340 cy will be removed during the soil column excavation.

Five receptors types were evaluated as a part of the Risk Assessment (RA). These included current on-site landscaper and utility worker; current off-site landscaper and utility worker; current resident; future on Site resident; and future Site landscaper and utility worker. Potential exposures to chemicals detected in shallow soils (from 0 to 10 feet bgs) were evaluated for the direct contact pathways, as well as inhalation of outdoor air vapors and fugitive dust. The results of the RA indicated no unacceptable risk for current residents and workers; however, PCBs, PCE, and TCE may pose an unacceptable health risk (greater than $1 \times 10^{-6}$) under a future, upper-floor residential scenario. In addition, PCBs and PCE may pose an unacceptable health risk (greater than $1 \times 10^{-5}$) to future Site landscapers and utility workers. Remediation activities would mitigate risk for future Site workers and residents from the following future exposure pathways: inhalation of indoor air vapors from Site soils, soil vapor, and groundwater; and incidental ingestion and dermal contact with Site shallow soils and inhalation of outdoor air fugitive dust/vapors.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.

   The proposed project involves excavating impacted soils, and destroying contaminants in the source zone by electrical resistive heating. The Site is currently occupied by a fitness center. Following proposed project completion, a deed restriction would be implemented with conditions that prohibit sensitive land uses (i.e., single family residence, hospitals, schools, or child-care centers), specify new building construction (i.e., first floor non-residential, upper floor residential, and inclusion of vapor control system), and prohibit Site groundwater extraction for municipal (i.e., drinking water purposes), industrial, and agricultural (i.e., irrigation) use.

There is potential for Site workers to be exposed to health hazards during the course of the remedial activities. Therefore, a Site-specific health and safety plan would be prepared to minimize potential health hazards to the Site workers.

SCAQMD requirements would control potential dust and/or vapor emissions by the project activities. Additionally, measures to further control emissions (i.e., dust suppression, addition carbon adsorption capacity, etc.) will be readily available.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Although a significant hazard is not foreseen, a Site-specific health and safety plan will be developed to address potential risks.

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

There is no school within ¼ mile of the Site.

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.

The project Site is not included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, but is being remediated pursuant to a Remedial Action Order issued by the California DTSC.

e. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

The remedial activity is a temporary project and it is limited to the boundary Site. Contractors will use appropriate traffic control to direct trucks in and out of the Site to eliminate any chance of interference with the community traffic.

***Specific References (list a, b, c, etc):***

- URS 2004, Groundwater Remedial Investigation Report.
- GeoSyntec 2004 Risk Assessment 4144 Glencoe Avenue
- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- Department of Toxic Substances Control: http://www.dtsc.ca.gov
- California Government Code Section 65962.5: http://www.leginfo.ca.gov/calaw.html

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 8. Hydrology and Water Quality

***Project activities likely to create an impact:***

Proposed project activities are not expected to create an impact to hydrology and water quality.

***Description of Environmental Setting*:**

The Site topography is nearly flat with an approximate elevation of 23 ft above mean sea level. Surface drainage is to the southwest, towards Glencoe Avenue. The Site is situated within the Ballona Gap subarea of the Santa Monica Groundwater Basin, which underlies the Los Angeles Coastal Plain. The Ballona Gap is a partially filled channel of the ancestral Los Angeles River. The ancestral Los Angeles River formerly flowed westward from its current southward path through the Dominguez Gap. The Ballona Gap, which was formed by the Los Angeles River and Ballona Creek, was subsequently channelized and partially refilled with sand, gravel and riprap [URS, 2004a].

The closest groundwater production wells completed in Aquifer C within the Santa Monica Basin are two inactive well fields located approximately two miles north and northeast of the subject property, in an upgradient direction. The two well fields are the City of Santa Monica Arcadia Well Field and the Southern California Water Company Charnock Well Field. The wells within these two well fields were shut down in 1996 and 1997 due to the presence of methyl tertiary butyl ether (MTBE) in the groundwater. Water formerly extracted from these fields contained detectable concentrations of VOCs, primarily TCE and PCE, which required well-head treatment to remove the contaminants prior to distribution to customers. The City of Santa Monica water supply Well No. SM-1 is located more than four miles north (upgradient) of the Site. [URS, 2004a].

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Violate any water quality standards or waste discharge requirements.

   Despite the fact that groundwater at the Site is not withdrawn for use, the proposed project activities include components to limit further impacts to groundwater. The reduction of the source zone will mitigate further increase in concentrations and contribution to the dissolved-phase groundwater plume.

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

   Review of the geologic and hydrogeologic features at the Site indicate that the local stratigraphy consists of alternating permeable zones (sand and gravel) and less permeable zones (silt and clay) to depths of at least 90 ft bgs. In general, the stratigraphy encountered in the groundwater remedial investigation is consistent with the regional hydrostratigraphy.

   Groundwater production wells are completed in Aquifer C (Silverado Aquifer), which occurs below 65 ft bgs and consists of fine to medium-grained sand. Aquifer C is approximately 200 ft thick in the vicinity of the Site, and the depth to its base is approximately 250 to 300 ft bgs. The two nearest production wells are located approximately two miles north and northeast of the subject property, and in an upgradient direction.

   The proposed project activities would not extend into Aquifer C, and would not deplete groundwater supplies, or interfere with groundwater recharge.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site.

   There are no nearby streams or rivers. The Site is currently paved, and will be restored to its original conditions upon completion of project activities (i.e., the Site will be returned to existing grade and repaved).

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site.

   There are no nearby streams or rivers. The Site is currently paved, and will be restored to its original conditions upon completion of project activities (i.e., the Site will be returned to existing grade and repaved). There will be no change to drainage patterns in the area.

e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

The project activities will not create any runoff water. However, in the event of rain during project activities, the remediation contractor will be ready to control surface water runoff such that runoff from remedial activities does not leave the Site, or is properly discharged.

f. Otherwise substantially degrade water quality.

Current impacts to groundwater would be expected to be mitigated as the source zone is reduced, and further reduction would occur over time through natural attenuation.

Groundwater monitoring will be an ongoing process for a minimum of five years. The dissolved-phase plume will be monitored for stability. If, however, in the unlikely event that VOCs were to show an initial substantial increase, a contingency plan would be implemented to assess off-site risk. Frequency of further sampling will depend upon the trend and results obtained in first five years.

No groundwater treatment system is needed at the Site, so no permits are required. Groundwater is not potable at the Site. Natural attenuation of contaminants is occurring and is a component of the project. USEPA guidance in Performance Monitoring of MNA Remedies for VOCs in Groundwater [USEPA, 2004] establishes the criteria for groundwater monitoring. Monitoring results will be compared with baseline concentrations. In addition to comparing measured values (i.e., sampling data versus baseline data), statistical procedures also would be used to evaluate the variability associated with the data and to use estimates of variability to guide decision-making processes [USEPA, 2004]. Statistical methods are also available to facilitate analysis and comparison of trends by considering data variability through time [USEPA, 2004].

g. Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

The Site is not located within a 100-year flood plain.

h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Project activities are not located near a river or stream, and will not create flooding conditions.

i. Inundation by sieche, tsunami or mudflow.

The Site is located in the Venice district of Los Angeles, California. This area has no recent history of tsunami or mudflow.

***Specific References (list a, b, c, etc):***

- URS 2004, Groundwater Remedial Investigation Report.
- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- USEPA 2004. Performance Monitoring of MNA Remedies for VOCs in Groundwater

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

**9. Land Use and Planning**

***Project activities likely to create an impact:***

Imposition of a deed restriction.

***Description of Environmental Setting***:

Land use at the Site and in the vicinity of the Site is in transition from light industrial and commercial use to mixed-use, consisting of mixed commercial / non-residential and residential use. The redevelopment trend has accelerated dramatically in 2004-2005, with many demolition and redevelopment projects underway on Glencoe Avenue and on Redwood Avenue between Maxella Avenue to the south and W. Washington Boulevard to the north. Although the existing on-site building is operated as a fitness center, the future use of the Site is anticipated to reflect the redevelopment trend in the area and include a new building with first floor non-residential use and upper floor residential use.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

   The future use of the Site is expected to adhere to the Site's zoning classification. Any change in this zoning must be approved by the city of Los Angeles. As a safety precaution, a deed restriction will be imposed by DTSC on the Site to restrict future use of the property. The deed restriction will be implemented with conditions that prohibit sensitive land uses (i.e., single family residence, hospitals, schools, or child-care centers), specify new building construction (i.e., first floor non-residential, upper floor residential, and inclusion of vapor control system), and prohibit Site groundwater extraction for municipal (i.e., drinking water purposes), industrial, and agricultural (i.e., irrigation) use.

b. Conflict with any applicable habitat conservation plan or natural community conservation plan.

   The Site is not subject to conservation plan or natural community conservation plan.

***Specific References (list a, b, c, etc)***:
- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 10. Mineral Resources

***Project activities likely to create an impact***:

None. The 1.4-acre lot of the Site contains no known mineral resources. No resources of exploitable value are known to exist in the Site. The project will not result in an increase in the rate of use of any natural resources. No further analysis is necessary.

***Description of Environmental Setting***:

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

*Specific References (list a, b, c, etc):*

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 11. Noise

***Project activities likely to create an impact:***

Project activities associated with the excavation.

***Description of Environmental Setting:***

The Site is a 1.4-acre lot, consisting of a fenced parking area, a fitness center, and landscaped frontage. The Site vicinity is in transition from light industrial and commercial use to mixed-use, consisting of commercial and residential use. The redevelopment trend has accelerated dramatically in 2004-2005, with many demolition and redevelopment projects underway on Glencoe Avenue and on Redwood Avenue between Maxella Avenue to the south and W. Washington Boulevard to the north. This area encompasses the Site. Because of this, the ambient noise level at the Site is already quite high. Additional noise from the proposed project will be from construction traffic and heavy equipment operation.

Los Angeles' Noise Ordinance is contained in the Los Angeles Municipal Code Chapter IX, Article 2, Section 112.03, which refers to section 41.40 that states, 'No person shall, between the hours of 9:00 P.M. and 7:00 A.M. of the following day, perform any construction or repair work of any kind upon, or any excavating for, any building or structure, where any of the foregoing entails the use of any power driven drill, riveting machine excavator or any other machine, tool, device or equipment which makes loud noises to the disturbance of persons occupying sleeping quarters in any dwelling hotel or apartment or other place of residence'. An exceedence occurs whenever someone files a complaint

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

   Actual field work will likely be completed in a period of 30 to 60 days.

   The noise level at the Site should not exceed levels expected during normal community development projects within commercial districts involving construction of multi-story buildings. The noise level from heavy earth moving equipment will be the most pronounced and frequent.

   Noise levels will be monitored to evaluate the need for any protective equipment for the workers. Ear plugs or muffles may be used. Noise levels will also be monitored to evaluate the noise level for nearby residents. It is not expected that residents will experience noise levels above 85 decibels. The contractor will use the sound level meter to monitor the noise level.

   If needed, preventive and control measures include reducing the number of noise-producing vehicles or pieces of equipment operating at any given time, adjusting the hours of vehicles and equipment operation to accommodate the persons who are disturbed by the noise, and rerouting vehicle traffic.

b. Exposure of persons to or generation of excessive groundbourne vibration or groundbourne noise levels.

The project activities do not expose persons to a generation of excessive vibration or noise levels originating from the ground. The project activities are a temporary operation and will not result in substantial increases in vibration generated from the equipment due to the nature of the activities and the distance to human populations.

c. A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.

The project does not create a substantial permanent increase in ambient noise levels in the vicinity. The noise increase will only occur during the project activities which are expected to last 30 to 60 days.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Refer to above response in Section a.

***Specific References (a, b, c, etc)*:**

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 12. Population and Housing

***Project activities likely to create an impact*:**

None. The remediation activities are temporary and will not impact Population or Housing resources. Should further development of the Site be considered, additional environmental review may be necessary.

***Description of Environmental Setting*:**

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Induce substantial population growth in area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

*Specific References (list a, b, c, etc):*

GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated

☐ Less Than Significant Impact
☒ No Impact

## 13. Public Services

***Project activities likely to create an impact*:**

The project activities would not require additional public services (i.e., roads, fire protection, etc.). If needed, flammable materials such as fuel will be handled appropriately. The project will not result in the need for increased police protection. Security concerns will be handled by the owners of the Site.

Schools or recreational facilities will not be impacted since no additional personnel will move into the area as a result of temporary remediation activities. Therefore no further analysis is necessary.

***Description of Environmental Setting*:**

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

- Fire protection
- Police protection
- Schools
- Parks
- Other public facilities

*Specific References (list a, b, c, etc)*:

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 14. Recreation

***Project activities likely to create an impact*:**

None. Project activities are temporary and will not impact existing recreational facilities. Should further development of the Site be considered, additional environmental review may be necessary.

***Description of Environmental Setting*:**

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

b. Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

*Specific References (list a, b, c, etc):*

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 15. Transportation and Traffic

***Project activities likely to create an impact*:**

Soil will be excavated for off-site disposal and imported for use as backfill for the excavated areas.

***Description of Environmental Setting*:**

The Site is located north of the Marina Freeway (State Route 90) and west of Interstate 405. One exit leads to the Site, from State Route 90, which is Lincoln Boulevard.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).

The daily truck traffic would range from 10 to 15 vehicles that will arrive and depart from the site (two-way traffic) during peak traffic hours. Since the Site is located in a commercial zone with moderate-to-high local traffic, the increase in traffic due to the proposed project should have little impact on the community. Each truck will haul a single trailer and will carry approximately 10 cubic yards of soil each.

The roads least used by residents will be designated for truck traffic to minimize any increase in traffic. Minor traffic control may be arranged with the City of Los Angeles to minimize any additional traffic to the community, and timing could be planned so it does not coincide with school or work commutes.

Trucks will exit the 405 Freeway onto Freeway 90 (Marina Expressway) traveling West. Freeway 90 merges into Lincoln Boulevard (right turn). Trucks will then make first right onto Maxella Avenue and first left onto Glencoe Avenue (where Site is located on right side). The reverse route will use the same streets. This is the most direct route and provides minimal use of streets as the Site is located in close proximity to the Freeway. There are no schools along this route.

b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highway.

According to the Los Angeles Department of Transportation (LADOT), the projected amount of traffic generated by this project (10-15 trucks/ day) will not exceed the level of service established for this community. Specifically, Lincoln Boulevard or Maxella Avenue. Lincoln Boulevard has three lanes of traffic in either direction and Maxella has two lanes of traffic in either direction. Access to the site, for construction purposes, is best accomplished from these streets, as they are located within 1/2-mile of the Marina Expressway (Freeway 90). Additionally, the LADOT reported a traffic count at the intersection of Maxella Avenue and Lincoln Blvd to be 3,769 vehicles/day (eastbound) and 6,878 vehicles/day (westbound). Based on these traffic counts, the addition of 10 - 15 vehicles/day for a two to three week period is not expected to exceed the LOS for these streets (i.e., Lincoln Blvd and Maxella Ave).

c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

The remedial action is a temporary project. Contractor will use appropriate traffic control to direct trucks safely in and out of the Site.

d. Result in inadequate emergency access.

The remedial activities will be limited to the Site boundaries. The streets surrounding the Site will not be closed.

e. Result in inadequate parking capacity.

The project will not result in inadequate parking capacity, since all the activities will take place inside the project boundaries. There will only be a few personnel on Site during the remedial activities and there is an adequate amount of parking for these personnel. Therefore, no additional parking will be required.

f. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

The remedial activities will not create conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks). There are no bus turnouts, or bicycle racks near the Site.

***Specific References (list a, b, c, etc):***

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 16. Utilities and Service Systems

***Project activities likely to create an impact:***

Typical construction activities.

***Description of Environmental Setting:***

Electrical supply is provided by Southern California Edison Company. Natural Gas is available from the Southern California Gas Company. Sewer lines are located along Glencoe Avenue according to the City of Los Angeles Utilities Services Department. Adequate water mains and supply are also available through a fire hydrant grid system along Glencoe Avenue. The anticipated construction time for the project is estimated at 4 to 8 weeks.

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

The remedial activities will not exceed wastewater treatment requirements of the Regional Water Quality Control Board – Los Angeles Region. The remedial activities will not generate water runoff from the Site. Site sanitation facilities will be temporary, if needed.

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

The remedial activities will not result in construction of new water or wastewater treatment facilities.

c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

After the remedial activities, the Site will be restored to its original condition. No additional storm drains would be required for this Site.

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed.

The project will need a limited amount of water for the duration of the project to suppress dust and for the compaction purposes. The contractor will use the nearest metered fire hydrant (based on the permit from the City) to provide water for the remedial activities. However, the project does not require any new water supplies.

e. Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the providers existing commitments.

Planned remedial activities will not increase the need for wastewater treatment.

f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs.

None.

g. Comply with federal, state, and local statutes and regulations related to solid waste.

The remedial activities are in compliance with the applicable State regulations including the California Integrated Waste Management Board [www.ciwmb.ca.gov Chapter 3 Article 5.6] and will be performed under the direct oversight of DTSC.

***Specific References (list a, b, c, etc)*:**

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan.
- California Integrated Waste Management Board [www.ciwmb.ca.gov Chapter 3 Article 5.6]

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 17. Mandatory Findings of Significance

Analysis of Potential Impacts. Describe to what extent project activities would:

a. Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

The Site is located in the Venice district in the City of Los Angeles. The remedial activities are a short-term project. The clean up activities will not create water runoff to affect the water ways. Therefore, the project activities will not have a significant potential to degrade the quality of the environment. It will not reduce habitat of fish or wildlife species. It will not threaten or eliminate plants or animals in the community, restrict the range of rare or endangered plants or animals, nor eliminate important periods of California history or prehistory.

b. Have impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

The project will not have cumulative impacts on the environment. The project involves temporary activities (anticipated to last approximately 60 days). The project activities will return the Site to its original uses and will not have considerable impacts on past, current, or probable future projects.

c. Have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

The remedial activities will not cause substantial adverse effects on human beings. There will be minimal amount of air emissions during the short duration of this temporary project. The emissions will be below the threshold level allowed by SCAQMD. There will be noise generated during project activities, but will fall below threshold limits and will be short term and intermittent.

*Specific References (list a, b, c, etc):*

- GeoSyntec 2005a, Feasibility Study Report.
- GeoSyntec 2005b, Draft Remedial Action Plan

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## *V. FINDING OF DE MINIMIS IMPACT TO FISH, WILDLIFE AND HABITAT **(Optional)***

Prepared only if a Finding of De Minimis Impact to fish, wildlife and habitat is proposed in lieu of payment of the Department of Fish and Game Notice of Determination filing fee required pursuant to section 711.4 of the Fish and Game Code.

Instructions

A finding of "no potential adverse effect" must be made to satisfy the requirements for the Finding of De Minimis Impact as required by title 14, California Code of Regulations, section 753.5. "No potential adverse effect" is a higher standard than "no significant impact" and the information requested to provide substantial evidence in support of a "no potential adverse effect" is not identical in either its standard or content to that in other parts of the Initial Study.

In the *Explanation and Supporting Evidence* section below, provide substantial evidence as to how the project will have **no potential adverse effect** on the following resources:

a) Riparian land, rivers, streams, watercourse, and wetlands under state and federal jurisdiction.

b) Native and non-native plant life and the soil required to sustain habitat for fish and wildlife.

c) Rare and unique plant life and ecological community's dependent on plant life.

d) Listed threatened and endangered plant and animals and the habitat in which they are believed to reside.

e) All species of plant or animals as listed as protected or identified for special management in the Fish and

Game Code, the Public Resources Code, the Water Code, or regulation adopted there under.

f) All marine and terrestrial species subject to the jurisdiction of the Department of Fish and Game and the ecological communities in which they reside.

g) All air and water resources the degradation of which will individually or cumulatively result in a loss of biological diversity among the plants and animals residing in that air and water.

Explanation and Supporting Evidence

The project will have no significant adverse effect on riparian land, rivers, streams, watercourse, and wetlands under state and federal jurisdiction, as the project activities will occur in the parking lot of the Site that is not a habitat for biological resources (see Section 4). There are no identified riparian land, rivers, streams, watercourse, or wetlands within ¼-mile of the Site.

The project will have no significant adverse effect on native and non-native plant life and the soil required to sustain habitat for fish and wildlife, nor will it have a potential adverse effect on rare plant life and ecological community's dependent on plant life as the Site is currently paved and will be restored to original conditions subsequent to the project activities (see Section 4).

The project will have no significant adverse effect on listed threatened and endangered plants and animals and the habitat in which they are believed to reside as no plant or animal species of endangered, threatened, or rare status have been reported at the Site (see Section 4).

The project will have no significant adverse effect on any species of plant or animals listed as protected or identified for special management in the Fish and Game Code, the Public Resources Code, the Water Code, or regulation adopted there under. The project activities will not take place near a biological habitat, and no endangered plants and animals are believed to reside at or near the Site (see Section 4).

The project will have no significant adverse effect on marine and terrestrial species subject to the jurisdiction of the Department of Fish and Game and the ecological communities in which they reside, nor will it have a potential adverse effect on air and water, the degradation of which will individually or cumulatively result in a loss of biological diversity among the plants and animals residing in that air and water. Project activities will occur on Site. The Site is paved, and consists of a fenced parking area, a building, and landscaped frontage. No biological habitats exist near or around the Site (see Section 4).

*Finding*

Based on the explanation and supporting evidence provided above, DTSC finds that the project will have no potential for adverse effect, either individually or cumulatively on fish and wildlife, or the habitat on which it depends, as defined by section 711.2 of the Fish and Game Code.

## *VI. DETERMINATION OF APPROPRIATE ENVIRONMENTAL DOCUMENT*

On the basis of this Initial Study:

☒ I find that the proposed project COULD NOT have a significant effect on the environment. A NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED DECLARATION will be prepared.

☐ I find that the proposed project MAY HAVE a significant effect on the environment. An ENVIRONMENTAL IMPACT REPORT will be prepared.

Ryan Kinsella | Oct. 14 2005
DTSC Project Manager Signature | Date

Ryan Kinsella | Hazardous Substance Scientist | ( 818 ) 551-2961
DTSC Project Manager Name | DTSC Project Manager Title | Phone #

Sayareh Amir | 10-14-05
DTSC Branch/Unit Chief Signature | Date

Sayareh Amir | Chief, Southern California Cleanup Operations- Glendale | ( 818 ) 551-2822
DTSC Branch/Unit Chief Name | DTSC Branch/Unit Chief Title | Phone #

## ATTACHMENT A

# INITIAL STUDY REFERENCE LIST

For

4144 Glencoe Avenue Site, Los Angeles, California
(Project Name)

Ballona Wetlands Foundation: http://www.ballona-wetlands.org

Ballona Wetlands Land Trust Webpage: http://www.ballona.org

California Department of Water Resources, 1961. Planned Utilization of the Ground Water Basins of Los Angeles County, Appendix A – Ground Water Geology. June.

California Government Code Section 65962.5: http://www.leginfo.ca.gov/calaw.html

California Integrated Waste Management Board, Chapter 3 Article 5.6: http://www.ciwmb.ca.gov

California Natural Diversity Database, Wildlife & Habitat Data Analysis Branch, Department of Fish and Game, September 2, 2005 (Version Date)

Caltrans Scenic Highways: http://www.dot.ca.gov/hq/LandArch/scenic_highways/scenic_hwy.htm

Department of Conservation: http://www.consrv.ca.gov/dlrp/index.htm

Department of Fish and Game: http://www.dfg.ca.gov

Department of Toxic Substances Control: http://www.dtsc.ca.gov

GeoSyntec, 2004. Risk Assessment, 4144 Glencoe Avenue Site, Los Angeles, California, 23 April 2004.

GeoSyntec 2005a, Feasibility Study Report, 4144 Glencoe Avenue Site, Los Angeles, California, 30 June 2005.

GeoSyntec 2005b, Draft Remedial Action Plan, 4144 Glencoe Avenue Site, Los Angeles, California, August 2005.

Office of Historic Preservation: http://ohp.parks.ca.gov

Poland, J.F., A.A. Garrett and A. Sinnott, 1959. Geology, Hydrology and Chemical Character of Ground Waters in the Torrance-Santa Monica Area, California, U.S. Geological Survey Water Supply Paper 1461.

South Coast Air Quality Management District 2002, Air Quality Standards Compliance Report, Vol. 15, No. 12, September 1993.

URS Corporation (URS), 2004a, Groundwater Remedial Investigation Report, 4144 Glencoe Avenue, Los Angeles, California.

United States Environmental Protection Agency (USEPA), 2004. Performance Monitoring of MNA Remedies for VOCs in Groundwater.

U.S. Fish and Wildlife Service: http://www.fws.gov

**California Department of Fish and Game**
**Natural Diversity Database**
**Selected Elements by Scientific Name - Portrait**
**Venice Quad for 4144 Glencoe, Los Angeles**

| | Scientific Name/Common Name | Element Code | Federal Status | State Status | GRank | SRank | CDFG or CNPS/R-E-D |
|---|---|---|---|---|---|---|---|
| 1 | *Astragalus pycnostachyus var. lanosissimus*<br>Ventura Marsh milk-vetch | PDFAB0F7B1 | Endangered | Endangered | G2T1 | S1.1 | 1B/3-3-3 |
| 2 | *Astragalus tener var. titi*<br>coastal dunes milk-vetch | PDFAB0F8R2 | Endangered | Endangered | G1T1 | S1.1 | 1B/3-3-3 |
| 3 | *Charadrius alexandrinus nivosus*<br>western snowy plover | ABNNB03031 | Threatened | | G4T3 | S2 | SC |
| 4 | *Chorizanthe parryi var. fernandina*<br>San Fernando Valley spineflower | PDPGN040J1 | Candidate | Endangered | G2T1 | S1.1 | 1B/3-3-3 |
| 5 | *Euphilotes battoides allyni*<br>El Segundo blue butterfly | IILEPG201B | Endangered | | G5T1 | S1 | |
| 6 | *Perognathus longimembris pacificus*<br>Pacific pocket mouse | AMAFD01042 | Endangered | | G5T1 | S1 | SC |
| 7 | *Polioptila californica californica*<br>coastal California gnatcatcher | ABPBJ08081 | Threatened | | G3T2 | S2 | SC |
| 8 | *Sterna antillarum browni*<br>California least tern | ABNNM08103 | Endangered | Endangered | G4T2T3Q | S2S3 | |

## *Astragalus pycnostachyus var. lanosissimus*

Ventura Marsh milk-vetch

Element Code: PDFAB0F7B1

**Status**
Federal: Endangered
State: Endangered

**NDDB Element Ranks**
Global: G2T1
State: S1.1

**Other Lists**
CNPS List: 1B
R-E-D Code: 3-3-3

**Habitat Associations**
General: COASTAL SALT MARSH.
Micro: WITHIN REACH OF HIGH TIDE OR PROTECTED BY BARRIER BEACHES, MORE RARELY NEAR SEEPS ON SANDY BLUFFS. 1-35M.

Occurrence No. 4 Map Index: 01453 EO Index: 19295
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: CHANDLER, H. #2045 UC (HERB)

**Dates Last Seen**
Element: 1902-09-09
Site: 1981-XX-XX
Record Last Updated: 1993-10-04

Quad Summary: VENICE (3311884/090B), BEVERLY HILLS (3411814/111C)
County Summary: LOS ANGELES

Lat/Long: 33.98612° / -118.45702°
UTM: Zone-11 N3761573 E365419
Radius: 1 mile
Elevation: 5 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Township: 02S
Range: 15W
Section: XX Qtr: XX
Meridian: S

Location: BALLONA MARSHES AND RANCHO.
Location Detail: VICINITY IS PRESENTLY MARINA DEL REY AND THE SOUTH PART OF VENICE. THIS SITE INCLUDES COLLECTIONS FROM "BALLONA HARBOR", "PLAYA DEL REY", "NEAR PALMS", AND COLLECTIONS FROM THE GENERAL VICINITY OF "LOS ANGELES COUNTY".
Threat: MARSHES NOW DRAINED.
General: NINE COLLECTIONS MADE BETWEEN 1888 AND 1902 ARE ATTRIBUTED TO THIS SITE. AREA SEARCHED BY BARNEBY (1964) AND SCHREIBER (1981); HISTORIC POPULATIONS ARE PRESUMED EXTIRPATED.
Owner/Manager: UNKNOWN

## *Astragalus tener var. titi*

coastal dunes milk-vetch

Element Code: PDFAB0F8R2

**Status**
Federal: Endangered
State: Endangered

**NDDB Element Ranks**
Global: G1T1
State: S1.1

**Other Lists**
CNPS List: 1B
R-E-D Code: 3-3-3

**Habitat Associations**
General: COASTAL BLUFF SCRUB, COASTAL DUNES.
Micro: MOIST, SANDY DEPRESSIONS OF BLUFFS OR DUNES ALONG AND NEAR THE PACIFIC OCEAN; ONE SITE ON A CLAY TERRACE. 1-50M.

Occurrence No. 4 Map Index: 42744 EO Index: 42744

**Dates Last Seen**
Element: 1903-04-12
Site: 1903-04-12

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: ABRAMS, L. #2351 RSA (HERB)

Record Last Updated: 2000-04-12

Quad Summary: INGLEWOOD (3311883/090A), VENICE (3311884/090B), HOLLYWOOD (3411813/111D), BEVERLY HILLS (3411814/111C)
County Summary: LOS ANGELES

Lat/Long: 33.97672° / -118.37467°
UTM: Zone-11 N3760426 E373012
Radius: 5 mile
Elevation: 150 ft

Mapping Precision: NON-SPECIFIC
Symbol Type: POINT

Township: 02S
Range: 14W
Section: 20 Qtr: XX
Meridian: S

Location: HYDE PARK (NEAR PRESENT DAY INGLEWOOD).
Location Detail: EXACT LOCATION NOT KNOWN. MAPPED IN THE GENERAL VICINITY OF INGLEWOOD.
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1903 COLLECTION BY L. ABRAMS. R. BARNEBY (1964) BELIEVES THIS SITE IS PROBABLY EXTIRPATED.
Owner/Manager: UNKNOWN

## *Charadrius alexandrinus nivosus*

western snowy plover

Element Code: ABNNB03031

**Status**
Federal: Threatened
State: None

**NDDB Element Ranks**
Global: G4T3
State: S2

**Other Lists**
CDFG Status: SC

**Habitat Associations**
General: (NESTING) FEDERAL LISTING APPLIES ONLY TO THE PACIFIC COASTAL POPULATION.
Micro: SANDY BEACHES, SALT POND LEVEES & SHORES OF LARGE ALKALI LAKES. NEEDS SANDY, GRAVELLY OR FRIABLE SOILS FOR NESTING.

---

Occurrence No. 36 Map Index: 01488 EO Index: 7920

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: PAGE, G. & L. STENZEL 1981 (LIT)

Dates Last Seen
Element: 1914-XX-XX
Site: 1914-XX-XX
Record Last Updated: 1998-10-14

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.95266° / -118.44858°
UTM: Zone-11 N3757852 E366147
Area: 154.1 ac
Elevation: 10 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 02S
Range: 15W
Section: 33 Qtr: XX
Meridian: S

Location: PLAYA DEL REY.
General: ONE EGG SET COLLECTED IN 1914 BY U.S. NATIONAL MUSEUM.
Owner/Manager: DPR-DOCKWEILER SB, PVT

---

Occurrence No. 37 Map Index: 36797 EO Index: 21223

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: PAGE, G. & L. STENZEL 1981 (LIT)

Dates Last Seen
Element: 1904-XX-XX
Site: 1904-XX-XX
Record Last Updated: 1998-11-24

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.96645° / -118.45814°
UTM: Zone-11 N3759393 E365285
Area: 31.6 ac
Elevation: 10 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 02S
Range: 15W
Section: 28 Qtr: XX
Meridian: S

Location: BALLONA BEACH (DOCKWEILER STATE BEACH).
Location Detail: MAPPED AT THE BEACH NORTH OF BALLONA CREEK.
General: FORTY-SIX EGG SETS COLLECTED BY THE NATIONAL MUSEUM OF NATURAL HISTORY BETWEEN 1894-1904.
Owner/Manager: DPR-DOCKWEILER SB

## *Chorizanthe parryi var. fernandina*

San Fernando Valley spineflower

Element Code: PDPGN040J1

**Status**
Federal: Candidate
State: Endangered

**NDDB Element Ranks**
Global: G2T1
State: S1.1

**Other Lists**
CNPS List: 1B
R-E-D Code: 3-3-3

**Habitat Associations**
General: COASTAL SCRUB.
Micro: SANDY SOILS. 3-1035M.

Occurrence No. 9 Map Index: 23785 EO Index: 41266
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: ABRAMS, L. #1217 DS (HERB)

**Dates Last Seen**
Element: 1901-04-01
Site: 1901-04-01
Record Last Updated: 2002-07-11

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.97291° / -118.44837°
UTM: Zone-11 N3760097 E366198
Radius: 1 mile
Elevation: 5 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Township: 02S
Range: 15W
Section: XX Qtr: XX
Meridian: S

Location: BALLONA HARBOR.
Location Detail: MAPPED IN VICINITY OF THE MOUTH OF BALLONA CREEK AND MARINA DEL REY.
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1901 COLLECTION BY L. ABRAMS. NEEDS FIELDWORK. MUCH OF THE SUITABLE HABITAT IN THIS AREA HAS BEEN DEVELOPED.
Owner/Manager: UNKNOWN

## *Euphilotes battoides allyni*

El Segundo blue butterfly

Element Code: IILEPG201B

**Status**

**Federal:** Endangered
**State:** None

**NDDB Element Ranks**

**Global:** G5T1
**State:** S1

**Other Lists**

**CDFG Status:**

**Habitat Associations**

**General:** RESTRICTED TO REMNANT COASTAL DUNE HABITAT IN SOUTHERN CALIFORNIA.

**Micro:** HOSTPLANT IS ERIOGONUM PARVIFOLIUM; LARVAE FEED ONLY ON THE FLOWERS AND SEEDS; USED BY ADULTS AS MAJOR NECTAR SOURCE.

---

**Occurrence No.** 1 **Map Index:** 01535 **EO Index:** 14469

**Occ Rank:** Unknown
**Origin:** Natural/Native occurrence
**Presence:** Presumed Extant
**Trend:** Decreasing
**Main Source:** ARNOLD, R. 1978 (LIT)

**Dates Last Seen**
**Element:** 1988-XX-XX
**Site:** 1988-XX-XX

**Record Last Updated:** 2005-06-22

**Quad Summary:** VENICE (3311884/090B)
**County Summary:** LOS ANGELES

**Lat/Long:** 33.93791° / -118.43366°
**UTM:** Zone-11 N3756197 E367502
**Area:** 119.4 ac
**Elevation:** 140 ft

**Mapping Precision:** SPECIFIC
**Symbol Type:** POLYGON

**Township:** 03S
**Range:** 15W
**Section:** XX **Qtr:** XX
**Meridian:** S

**Location:** EL SEGUNDO DUNES, JUST WEST OF LOS ANGELES INTERNATIONAL AIRPORT.

**Location Detail:** 70% OF AN ESTIMATED 756 ERIOGONUM PARVIFOLIUM PLANTS ARE SENESCING. TWO OF THE 16 ERIOGONUM PATCHES SUPPORT 75% OF THE EL SEGUNDO BLUE POPULATION.IN 1988, FOUND ON ONLY 20 ACRES, <3 ACRES WITH HIGH DENSITY.

**Ecological:** LARVAL FOOD PLANT IS ERIOGONUM PARVIFOLIUM. IN 1988 LAX AIRPORT BOARD AUTHORIZED A CONTINUING 3 YR PROGRAM OF HABITAT RESTORATION.

**Threat:** POPULATION NUMBERS ARE LOW ENOUGH TO POSSIBLY CAUSE GENETIC PROBLEMS. INVASIVE NON-NATIVE PLANTS.

**General:** HABITAT QUALITY POOR DUE TO EXOTIC PLANTS STABILIZING THE SAND. POP EST 1984, 750; 1986, 800; 1987, 1600; 1988, 2500 (1029 ADULTS SEEN).

**Owner/Manager:** PVT-LAX AIRPORT

---

**Occurrence No.** 2 **Map Index:** 01586 **EO Index:** 23047

**Occ Rank:** Unknown
**Origin:** Natural/Native occurrence
**Presence:** Presumed Extant
**Trend:** Decreasing
**Main Source:** ARNOLD, R. 1978 (LIT)

**Dates Last Seen**
**Element:** 1984-08-XX
**Site:** 1984-08-XX

**Record Last Updated:** 2005-06-22

**Quad Summary:** VENICE (3311884/090B)
**County Summary:** LOS ANGELES

**Lat/Long:** 33.91611° / -118.42147°
**UTM:** Zone-11 N3753764 E368596
**Radius:** 1/5 mile
**Elevation:** 150 ft

**Mapping Precision:** NON-SPECIFIC
**Symbol Type:** POINT

**Township:** 03S
**Range:** 15W
**Section:** XX **Qtr:** XX
**Meridian:** S

**Location:** EL SEGUNDO DUNES-CHEVRON REFINERY COLONY.

**Location Detail:** PRESERVE CONTAINS REMNANT DUNE HABITAT ON REFINERY PROPERTY

**Ecological:** ERIOGONUM PARVIFOLIUM IS THE MAJOR FOOD PLANT AND IT IS BEING REASTABLISHED, WEEDY PLANTS REMOVED.

**Threat:** NON-NATIVE PLANTS OUT COMPETING FOOD AND NATIVE DUNE PLANT.

**General:** EL SEGUNDO BLUE POPULATION AT THIS SITE HAS DECLINED DRAMATICALLY OVER THE EIGHT YEARS THAT ARNOLD HAS BEEN ANALYZING IT. 1984 POP EST 334 INDIVIDUALS, CAPTURE-RECAPTURE STUDY. POP EST 357, MAY BE LEVELING OUT, 1986.

**Owner/Manager:** LAX COUNTY-MANHATTAN BEACH

## *Perognathus longimembris pacificus*

Pacific pocket mouse

Element Code: AMAFD01042

**Status**
Federal: Endangered
State: None

**NDDB Element Ranks**
Global: G5T1
State: S1

**Other Lists**
CDFG Status: SC

**Habitat Associations**
General: INHABITS THE NARROW COASTAL PLAINS FROM THE MEXICAN BORDER NORTH TO EL SEGUNDO, LOS ANGELES CO.
Micro: SEEMS TO PREFER SOILS OF FINE ALLUVIAL SANDS NEAR THE OCEAN, BUT MUCH REMAINS TO BE LEARNED.

Occurrence No. 2 Map Index: 39858 EO Index: 34860
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: ERICKSON, R. A. 1993 (LIT)

**Dates Last Seen**
Element: 1938-06-XX
Site: 1938-06-XX

Record Last Updated: 2003-04-10

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.93139° / -118.42565°
UTM: Zone-11 N3755463 E368233
Area: 5,595.0 ac
Elevation: 100 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 03S
Range: 15W
Section: 11 Qtr: XX
Meridian: S

Location: MARINA DEL REY/EL SEGUNDO AREA.
Location Detail: COLLECTION LOCALITIES INCLUDEL: DEL REY, PLAYA DEL REY, PALISADES DEL REY, DEL REY HILLS NEAR LOYOLA UNIVERSITY, HYPERION, & 1 MILE NORTH & 1/2 MILE NW OF EL SEGUNDO.
General: HISTORIC SITE. 118 SPECIMENS COLLECTED BETWEEN NOV 1918 AND JUN 1938. SPECIMENS ARE DEPOSITED IN SBMNH, LACM, SDNMH, MVZ, AND UA.
Owner/Manager: UNKNOWN

## *Polioptila californica californica*

coastal California gnatcatcher

Element Code: ABPBJ08081

**Status**
**Federal:** Threatened
**State:** None

**NDDB Element Ranks**
**Global:** G3T2
**State:** S2

**Other Lists**
**CDFG Status:** SC

**Habitat Associations**
**General:** OBLIGATE, PERMANENT RESIDENT OF COASTAL SAGE SCRUB BELOW 2500 FT IN SOUTHERN CALIFORNIA.
**Micro:** LOW, COASTAL SAGE SCRUB IN ARID WASHES, ON MESAS & SLOPES. NOT ALL AREAS CLASSIFIED AS COASTAL SAGE SCRUB ARE OCCUPIED.

**Occurrence No.** 35 **Map Index:** 01722 **EO Index:** 25112
**Occ Rank:** Unknown
**Origin:** Natural/Native occurrence
**Presence:** Presumed Extant
**Trend:** Unknown
**Main Source:** ATWOOD, J. 1980 (LIT)

**Dates Last Seen**
**Element:** 1980-XX-XX
**Site:** 1980-XX-XX

**Record Last Updated:** 1989-08-10

**Quad Summary:** INGLEWOOD (3311883/090A), VENICE (3311884/090B), HOLLYWOOD (3411813/111D), BEVERLY HILLS (3411814/111C)
**County Summary:** LOS ANGELES

**Lat/Long:** 33.99055° / -118.38285°
**UTM:** Zone-11 N3761970 E372277
**Radius:** 1 mile
**Elevation:** 200 ft
**Mapping Precision:** NON-SPECIFIC
**Symbol Type:** POINT
**Township:** 02S
**Range:** 14W
**Section:** 18 **Qtr:** SE
**Meridian:** S

**Location:** BALDWIN HILLS, VICINITY CULVER CITY
**Ecological:** HABITAT IS COASTAL SAGE SCRUB, DOMINATED BY ARTEMISIA CALIFRONICA, ERIOGONUM FASCICULATUM, AND SALVIA MELLIFERA.
**Threat:** THREATENED BY ONGOING URBAN DEVELOPMENT, AS MANY MAJOR HABITAT AREAS ARE OWNED BY LAND COMPANIES.
**General:** ONE INDIVIDUAL OBSERVED; 1-3 PAIRS ESTIMATED.
**Owner/Manager:** UNKNOWN

## *Sterna antillarum browni*

California least tern

Element Code: ABNNM08103

**Status**
Federal: Endangered
State: Endangered

**NDDB Element Ranks**
Global: G4T2T3Q
State: S2S3

**Other Lists**
CDFG Status:

**Habitat Associations**
General: (NESTING COLONY) NESTS ALONG THE COAST FROM SAN FRANCISCO BAY SOUTH TO NORTHERN BAJA CALIFORNIA.
Micro: COLONIAL BREEDER ON BARE OR SPARSELY VEGETATED, FLAT SUBSTRATES: SAND BEACHES, ALKALI FLATS, LAND FILLS, OR PAVED AREAS.

---

Occurrence No. 12 Map Index: 01439 EO Index: 25699

Dates Last Seen — Element: 1996-XX-XX; Site: 1996-XX-XX

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: ATWOOD, J. ET AL 1977 (LIT)

Record Last Updated: 1998-10-21

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.96777° / -118.45888°
UTM: Zone-11 N3759541 E365219
Area: 4.6 ac
Elevation: 10 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 02S
Range: 15W
Section: 28 Qtr: XX
Meridian: S

Location: VENICE BEACH SITE. SOUTHERN END OF VENICE BEACH, NORTH OF BALLONA CREEK, PART OF DOCKWEILER STATE BEACH.

Location Detail: HISTORICALLY, BIRDS NESTED ALONG THIS ENTIRE BEACH STRAND. RECORDS FROM "DEL REY", "MARINA DEL REY" AND "DEL REY LAGOON". BIRDS ALSO NESTED ON FILL SITE FOR HARBOR. UCLA #32595. NESTING RECORDS FROM VENICE BEACH GO BACK TO 1898.

Ecological: PRIOR TO THE 1988 SEASON, NEST SITE WAS ENLARGED, AND A NEW FENCE ELIMINATED MUCH OF THE PREDATION AND DISTURBANCE.

Threat: 1990 CAT PREDATION, ATTEMPTS MADE TO TRAP. VEGETATION OVERGROWTH. NESTING FAILURE DUE TO LOCAL FOOD SHORTAGE.

General: 1973-84: MEAN OF 106 PR/YR, GOOD FLEDGING; 1985: 107 NESTS, 113 FLEDGED; 1987: 109 PR, 82 FLEDGED. 1988: 165 PR, 192 FLEDGED. 1990: 206 PR, 279 FLEDGED. 1991: 198 PR, 200 FLEDGED, 1992: 229 PR, 245 FLEDGED. 1996: 271 PR, 92 FLEDGED.

Owner/Manager: DPR-DOCKWEILER SB

---

Occurrence No. 13 Map Index: 01562 EO Index: 25698

Dates Last Seen — Element: 1977-XX-XX; Site: 1978-XX-XX

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: ATWOOD, J. ET AL 1977 (LIT)

Record Last Updated: 1998-10-21

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.97988° / -118.42637°
UTM: Zone-11 N3760842 E368241
Area: 3.5 ac
Elevation: 10 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 02S
Range: 15W
Section: 23 Qtr: XX
Meridian: S

Location: BEETHOVEN ST FILL. BALLONA CR.

Ecological: NESTING AREA TRIANGULARLY BORDERED BY BALLONA CREEK, FLOOD CONTROL CHANNEL, AND A FENCE. SUBSTRATE IS LIGHT COLORED, SANDY DREDGE MATERIAL WITH SPARSE VEGETATION COVER.

General: FIRST YEAR OF CONFIRMED NESTING HERE; POTENTIAL GOOD, EVEN THOUGH 3 PAIR FLEDGED 0. IN 1978 LARGE MOUNDS OF SANDY DREDGE MATERIAL WERE PLACED ON THE SITE RENDERING THE AREA UNSUITABLE FOR NESTING.

Owner/Manager: UNKNOWN

## *Sterna antillarum browni*

California least tern

Element Code: ABNNM08103

**Status**

Federal: Endangered
State: Endangered

**NDDB Element Ranks**

Global: G4T2T3Q
State: S2S3

**Other Lists**

CDFG Status:

**Habitat Associations**

General: (NESTING COLONY) NESTS ALONG THE COAST FROM SAN FRANCISCO BAY SOUTH TO NORTHERN BAJA CALIFORNIA.

Micro: COLONIAL BREEDER ON BARE OR SPARSELY VEGETATED, FLAT SUBSTRATES: SAND BEACHES, ALKALI FLATS, LAND FILLS, OR PAVED AREAS.

Occurrence No. 14 Map Index: 01492 EO Index: 13026

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: ATWOOD, J. ET AL 1979 (LIT)

**Dates Last Seen**

Element: 1981-00-00
Site: 1987-XX-XX

Record Last Updated: 1998-10-21

Quad Summary: VENICE (3311884/090B)
County Summary: LOS ANGELES

Lat/Long: 33.96461° / -118.44425°
UTM: Zone-11 N3759171 E366565
Area: 113.2 ac
Elevation:

Mapping Precision: SPECIFIC
Symbol Type: POLYGON

Township: 02S
Range: 15W
Section: XX Qtr: XX
Meridian: S

Location: PLAYA DEL REY. MARSH BOUNDED BY CULVER BLVD & VISTA DEL MAR RD & BALLONA CR.

Location Detail: 1965 OBSERVATION FROM MARINA DEL REY NEAR HARBOR AREA AND BALLONA CREEK. IN 1970'S-80'S TERNS USED SALT/MUD FLATS WITHIN MARSH. BREEDING AREAS ARE SUBJECT TO FLOODING IF BALLONA CREEK TIDE GATES ARE OPENED DURING BREEDING SEASON.

Ecological: TERNS NEST AND ROOST ON SALT/MUD FLATS; FEED IN THE MARINA, BALLONA CREEK, BALLONA LAGOON, AND CANALS IN THE AREA.

Threat: EQUESTRIANS, MOTORCYCLES, FLOODING OF NESTING AREAS.

General: 1965: BIRDS OBS. 1973-75 & 79-84: MEAN OF 11 PRS/YR. 1976: SITE ABANDONED. 1977: NO NESTING. 1978: 25-30 PRS, 30 FLEDGED. 1981-82: BREEDING AREA FLOODED. 1987: NO NESTING. NO MENTION OF THIS AREA IN MONITORING REPORTS AFTER 1987.

Owner/Manager: PVT-SUMMA CORP

# APPENDIX E

# RESPONSIVENESS SUMMARY

RESPONSE TO PUBLIC COMMENTS ON THE
DRAFT REMEDIAL ACTION PLAN (RAP)
FOR THE FORMER CORNELL-DUBILIER ELECTRONICS/ 4144 GLENCOE AVENUE SITE

## I. INTRODUCTION AND BACKGROUND

The former Cornell-Dubiler Electronics (CDE) Site (Site) is located at 4144 Glencoe Avenue, Los Angeles, California 90292 . The Site is contaminated with the following chemicals of concern: polychlorinated biphenyls (PCBs), tetrachloroethylene (PCE), and trichloroethylene (TCE). The Remedial Action Plan (RAP) includes a remedy consisting of selective soil excavation and Electrical Resistive Heating (ERH), followed by groundwater monitoring. A deed restriction may accompany the remedy to include requirements for protective measures for any future Site uses. The Department of Toxic Substances Control (DTSC) is the lead agency overseeing the investigation and cleanup.

The Site was used industrially from 1955 to the early 1980s. It was occupied by Cornell-Dubiler Electronics (CDE) from 1955 until 1971 and then by the Zenith Food Processing Company (Zenith) from 1972 until approximately 1984. Since the mid-1980s, the Site has been used for a variety of commercial uses.

In 1997, DTSC issued an Imminent and Substantial Endangerment Determination and Remedial Action Order to CDE. A Remedial Investigation (RI) was completed in 2004 which consisted of collecting soil, soil gas, and groundwater samples from several locations at the Site. Additional samples were collected off-property. The RI was approved by DTSC in 2004. Based on the data collected, a Risk Assessment (RA) was prepared. The RA found that the pre-cleanup levels of chemicals of concern at the Site may pose an unacceptable risk to human health and the environment for future workers and residents at the Site. In 2005, a Feasibility Study (FS) was completed which evaluated cleanup alternatives for the Site using U.S. EPA and DTSC guidelines, and was approved by DTSC. Based on the FS, a Remedial Action Plan (RAP) was prepared in accordance with the California Health and Safety Code section 25356.1. The RAP presents the cleanup alternative for the Site that best meets the criteria required by U.S. EPA and DTSC.

The activities associated with the Draft RAP include selective soil excavation of approximately 900 cubic yards of soil and Electrical Resistive Heating. The activites associated with the alternative are:

1. Excavation of certain PCB contaminated soil to a maximum depth of 10 feet below ground surface (bgs);

2. Excavation of contaminated soil in the source zone to a depth of 20 feet bgs (See attached map).

3. Installation of an Electrical Resistive Heating system and vapor recovery system, to safely remove PCE and TCE from the source zone.

Additional items are also included to complement this alternative:

4. Institutional controls such as a deed restriction which sets forth restrictions on future development of the property;
5. Engineered controls such as a vapor control barrier (a combination of vent pipes and a thick plastic liner to be installed under any new buildings at the property);
6. Ongoing groundwater testing to monitor contaminants that are dissolved in the groundwater; and
7. Post-cleanup soil vapor sampling.

The draft RAP for the Site was under public review from October 17, 2005 to November 15, 2005. The public review period was extended until December 16, 2005 to allow additional time for comments to be provided. Documents have been made available at the following public repositories:

Department of Toxic Substances Control
1011 North Grandview Avenue
Glendale, CA 91201
(818) 551-2886

Lloyd Taber-Marina del Rey Library
4533 Admiralty Way
Marina Del Rey, California 90292
(310) 821-3415

A public meeting was held on October 25, 2005 to present the draft RAP and receive and respond to comments and concerns. Several comments on the RAP were received during the public comment period and are presented below. Comments are grouped by individual commenter with DTSC responses following.

## II. RESPONSE TO COMMENTS

**Comment from Community Member**

**Comment 1:** What would you recommend if you lived down the block? Would you believe reassurances from self-interested parties? Would you remember all the times that noble scientists and engineers had simply underestimated dangers?  I suggest that we pursue option 3 just to be safe.  Who should pay? How about the companies responsible?

**DTSC Response 1:** As a public agency, DTSC takes the health of Californians very seriously.  That is why we review and critique each risk assessment in great detail, to ensure that it is conducted in a health protective manner, using reasonable maximum exposure parameters that will err if at all, on the side of public health.  After review of the risk assessment for this Site, DTSC is convinced that the proposed remedy will be protective of you and your neighbor's health, as well as the environment.

Based on the Feasibility Study, Alternative 3 (In-situ chemical oxidation) is not as likely as Alternative 2 to result in a significant reduction of contaminants throughout the area referred to as the "Source Zone".  The Source Zone was determined to be the area in which contaminants were released at the Site and the area in which dense, non-aqueous phase liquid (DNAPL) was identified. DNAPLs are high concentrations of contaminants that can accumulate in soil and move to groundwater.  DNAPLs can be an ongoing source of contamination in groundwater as they slowly dissolve.  DTSC believes that Alternative 2 (In-situ electrical resistive heating) can be implemented safely.  Monitoring will be conducted with oversight from DTSC during and following cleanup to ensure that appropriate safety measures are in place. DTSC oversees numerous cleanups each year and ensures they are carried out safely and effectively.

Under California law, DTSC has issued a cleanup order to Cornell-Dubilier Electronics, Inc., a party allegedly responsible for contamination at the Site, to conduct the Remedial Investigation, Feasibility Study and Remedial Action Plan. DTSC is seeking an agreement with Cornell Dubilier Electronics regarding the cleanup.  DTSC is overseeing all Site activities, which must be approved by DTSC before they are implemented.

**Comment from Community Member**

**Comment 2:** I am concerned about the "chronic health effect" of prolonged exposure to TCE, PCE, and PCBs.  I would like more information as to the specifics of the "chronic health effects," as well as any possible increased exposure risks or other health risks as a result of the proposed cleanup option.

**DTSC Response 2:** An assessment of the chronic health effects of PCE, TCE and PCBs is presented in the Risk Assessment (RA) that was performed for the Site. That document is available for review at the repositories mentioned above in Section I.   Further information is readily available on-line in the TOX FAQs at the Agency for Toxic Substances Disease Registry (ATSDR) at www.atsdr.cdc.gov, and the U.S. EPA Integrated Risk Information System at www.epa.gov/iris/index.html.  Regarding your concern with increased exposure risks or other health risks during the removal action, DTSC will review all plans and ensure measures are in place to control dust or other emissions from the Site during cleanup activities.  In addition, monitoring will take place during all remedial activities to ensure that these measures are effective so any dust or other contaminants are kept at levels that will not pose a health risk to the workers on the Site, or residents and others in the neighborhood of the Site.

**Comment from Community Member**

**Comment 3:** The specific block of Glencoe Ave. between Washington Blvd. (or Beach Ave.) and Maxella Avenue is getting more than its fair share of various environmental hazards, be that toxic waste, non-stop development (and the accompanying truck traffic, dust, and construction noise), exposure to cellular antennae and overcrowded street traffic (which will only get worse once all the new condominiums will be housed with “two-car” families), resulting in real bad street paving.  Taking the big picture into consideration, it seems you have chosen the minimalistic approach to remediate the situation – and that’s too bad. I believe the additional cost for a more thorough cleanup is well worth it, and the long-term health of the inhabitants of this building and surrounding areas should have been taken into consideration.  The factory/developer should be able to fit the bill.  Somehow, it seems to be a too easy a solution to pick the “middle ground”; whereas, it is pretty obvious that the “alternatives” have been designed so it would become almost impossible to pick any other alternative.  How convenient (but not very smart - as it will turn out that after all the cost over-runs, it would cost almost as much as Alternative 3 would have cost, but with far less benefit).

**DTSC Response 3:** DTSC appreciates your concerns regarding the impact of development on your neighborhood.  To determine what if any actions need to take place on the Site to make it safe for the long-term health of the people who will inhabit the building, a risk assessment was conducted using all the data collected from soil, vapor (air), and groundwater analysis.  The purpose of this risk assessment is to make certain that the Site does not pose an unacceptable cancer risk or non-cancer hazard to the short and long-term health of the inhabitants of any building on the property, any buildings in the neighborhood, or any wildlife and fauna living near the Site, such as in the Ballona Creek area. DTSC does not believe that the alternative recommended in the Draft RAP (Alternative 2, In-situ electrical resistive heating) represents a “middle ground.” In fact, it is estimated to cost more than Alternative 3.  Alternative 2 represents the best alternative for reducing Site contamination, including DNAPL.  See DTSC Responses 1 and 2 for more detailed information.

**Comment from Community Member**

**Comment 4:** This contamination was not legal and has the possibility to poison many people who will be unaware for many years beyond the time to be able to see.  Cornell should clean up the best way available despite the cost.  Option 3 should be mandatory if that will be the least toxic result.

My son has bone marrow poisoning from a toxic vapor.  Option 2 will cause toxic vapors!!  This is a <u>very</u> negative affect on our community, possibly relating to lawsuits.

**DTSC Response 4:**  DTSC appreciates your concern and is saddened to hear of your son's condition.  At the Site, a Risk Assessment was conducted which found that contaminants in the soil must be removed for future use of the Site.  The remedy was selected based on best engineering practices.  DTSC will continue to review the specific details of the removal plan, and provide oversight during the removal to ensure that all emissions of vapor and dust are kept at levels that will not pose a health risk to the workers on the Site, or residents and others in the neighborhood of the Site.

After careful review of Site conditions and types of contaminants, DTSC has determined that Alternative 2 (In-situ electrical resistive heating) can be implemented safely and is the best approach for Site cleanup.  During cleanup activities, an underground piping system will be installed that will capture vapors before they migrate to the surface.  The vapors will then be sent to a closed treatment system, thus minimizing any potential for vapor emissions.  During any excavation work, control measures will be used to minimize air emission from excavations.  Monitoring will be conducted during the remedy with oversight from DTSC to ensure proper controls are in place.  Please also see DTSC Response 2 for more information regarding health risks.

**Comment from Community Member**

**Comment 5:** I got this notice on the weekend and there was not enough time for me to plan to come (I had a dental appointment).  I would like to know if the toxic waste table could contaminate drinking water.

How did the contractors get the other buildings/condos/apartments built recently without doing environmental testing?  Lincoln & Maxella four big towers/condos had to do major soil removal and treatment years old when they started building.  I would think that there would be a good chance Villa Villetu and other complexes sit on contaminants/toxic land.  How can I find out?

**DTSC Response 5:**  During the Remedial Investigation, historical releases of contaminants to soil and groundwater were assessed.  Both soil and groundwater are the focus of the planned Site cleanup.  However, it is important to note that the shallow groundwater in the area that is contaminated is not used for drinking water.  All drinking water sources are regulated by the California Department of Health Services to ensure their safety.

Given the past industrial use of the neighborhood, it is possible that other sites may be impacted. The LARWQCB is currently overseeing investigations and cleanup activities at several sites in the area. Information about known contamination that has been reported to or identified by DTSC or the Los Angeles Regional Water Quality Control Board (RWQCB) can be accessed by visiting each agency's website, or by contacting DTSC in Glendale or RWQCB in Los Angeles. Contact information for DTSC and for the RWQCB follows:

DTSC:
1011 N. Grandview Avenue
Glendale, CA 91201-2205
Phone: (818) 551-2800
www.dtsc.ca.gov

Los Angeles Regional Water Quality Control Board:
320 West Fourth Street, Suite 200
Los Angeles, CA 90013-2343
Phone: (213) 576-6600
www.waterboards.ca.gov/losangeles

**Comments from Community Member**

**Comment 6a*:*** I have worked for Techmar Corp., located at 4150-A Glencoe Ave., for the last 12 years and am concerned about the fact that our offices are situated in such close proximity to the zone of contamination. If the toxic chemicals mentioned in your documents are continually evaporating and the air above ground is constantly moving, wouldn't this contaminated air be capable of migrating into our building, causing a health hazard?

I have various health problems and am concerned that they may be related to exposure to TCE and PCE vapors. My symptoms include: persistent skin rash, weight loss, vertigo, muscle weakness, and bruising. [Name omitted] of Techmar has contracted leukemia. Is there a physician in the Santa Monica area familiar with exposure to toxic chemicals that you could recommend? Would you please consider conducting an indoor air test in our building to ascertain definitively whether or not an exposure danger is present?

**DTSC Response 6a:** Generally, contamination that reaches the ground surface and then mixes with outdoor air is readily diluted to concentrations that do not pose a significant health risk. The Site is currently paved, which limits migration of contamination vapors to the outdoor air. Site investigation data indicate that contaminants from the Site do not pose a significant risk to occupants of 4150-A Glencoe Avenue. For example, a sample of soil gas collected at a depth of 5 feet below ground surface just to the west of the suite at 4150-A Glencoe Avenue showed no significant concentrations of PCE or TCE that would give rise to significant indoor air concerns. For this reason, DTSC does not believe indoor air testing is warranted based on known contamination from 4144 Glencoe Avenue. However, the Draft RAP does not address any issues relating to releases that may have occurred at the 4150-A Glencoe Avenue property itself.

While DTSC cannot recommend a specific physician to you, we can recommend that you contact one of the local medical schools or colleges in Southern California, and speak to a physician with expertise in environmental medicine and/or occupational health. In addition, Los Angeles County has a Department of Environmental Health where you may also find a physician to speak with.

**Comment 6b*:*** Commenter noted that one of DTSC's Microsoft PowerPoint slides contained an assumption that landscapers would be exposed to soil and outdoor air vapor "8 hours/day; 52 days /year; 25 years" and asked if this should read "52 weeks a year".

**DTSC Response 6b:** The slide (#25) on exposure parameters in the Power Point presentation given at the public meeting was correct. The landscaper's exposure to soil and outdoor air vapors was assumed to be 8 hours per day, 52 days per year, for 25 years. This was based on the assumption that a landscaper would work at the Site approximately one 8-hour day per week, for a total of 52 days per year.

**Comment from Community Member**

**Comment 7:** In response to Cleanup Options Evaluated for proposed Soil Cleanup Plan for former Cornell-Dubilier Electronics Site. We oppose and question the cleanup performed by a licensed contractor hired by Cornell.

The contractor should be hired by the California State Department of Toxic Substance Control or an agency that is not biased and will properly clean up the contamination and cleanup.

**DTSC Response 7:** At sites were DTSC has identified a party responsible for the contamination, DTSC seeks to have the party conduct the cleanup and pay for it with DTSC's approval and supervision. Consistent with that approach, DTSC has issued a cleanup order to Cornell-Dubilier Electronics, Inc., a party allegedly responsible for contamination at the Site, to conduct the Remedial Investigation, Feasibility Study and Remedial Action Plan. DTSC is seeking an agreement with Cornell-Dubilier Electronics regarding the cleanup. DTSC is overseeing all Site activities, which must be approved by DTSC before they are implemented.

**Comment from Community Member**

**Comment 8:** It is a little hard to attend a public meeting on 10/25/2005 when the mailed notice is received the afternoon of 10-26-2005!!

**DTSC Response 8:** DTSC regrets that the commenter did not receive the Fact Sheet until after the public meeting was held. The public comment period was extended until December 16, 2005 to allow additional time for comments to be provided. Site documents outlining the investigation and cleanup plan are available for review at the public repositories listed in the Introduction section above. DTSC will continue to be available to hear concerns and answer questions about the cleanup activities at the Site.

**Comment from Community Member**

**Comment 9:** Option 3 seems best to me. Who is paying for the cost?

**DTSC Response 9:** Please see DTSC Response 1.

**Comment from Community Member**

**Comment 10:** I think Option 3 is best and the only acceptable one.

**DTSC Response 10:** Please see DTSC Response 1.

**Comment from Community Member**

**Comment 11:** I think the cleanup should be done.

**DTSC Response 11:** The cleanup will be done. Please also see DTSC Response 7.

**Comment from**
**Department of Transportation**
**District 7, Office of Regional Planning**
**IGR/CEQA Branch**
**100 South Main Street**
**Los Angeles, CA 90012**

**Comment 12:** Dear Mr. Kinsella: Thank you for including the California Department of Transportation in the environmental review process for the proposed plan to remove contaminated soil from the property located at 4144 Glencoe Avenue in the Venice area of the City of Los Angeles. The remedial plan consists of selective soil excavation and electrical resistive heating, and groundwater monitoring.

Based on a review of the initial study/negative declaration received, we have no comments other than just to request that project-related truck trips expected to use State Route 1, 90, and 405 be limited to off-peak commute periods as much as possible. Generally during weekdays, peak commuting periods occur from 6:00 – 9:00 AM and from 4:00 to 7:00 PM.

**DTSC Response 12:** DTSC notes the traffic request and will consider it during the preparation of the Remedial Design project documents.

**Comments from**
**Blasland, Bouck & Lee, Inc.**
**801 North Brand Blvd., Suite 1120**
**Glendale, CA 91230**

On behalf of the subject property owners, Glencoe Properties, LLC, Blasland, Bouck & Lee, Inc. (BBL) has reviewed and presents herein comments and questions concerning the document Draft Remedial Action Plan, 4144 Glencoe Avenue Site, Los Angeles, California 90202, dated September 2005 (RAP) and prepared by GeoSyntec Consultants (GeoSyntec) on behalf of Cornell-Dubilier Electronics, Inc.

In conjunction with the review of the RAP, BBL has reviewed supporting documents which the RAP relies upon and or associated with the RAP, including:

- Feasibility Study (FS) Report (September 2005)
- Supplement to Feasibility Study Report (September 2005)
- Feasibility Study Report Response to Comments and replacement pages (September 2005)
- Risk Assessment (RA) (April 23, 2004)

We refer to the documents collectively as "the documents" or individually as abbreviated above. The documents were prepared by GeoSyntec Consultants on behalf of Cornell-Dubilier Electronics, Inc.

BBL's comments are organized into the three primary categories associated with the documents: (1) Remedial Action Objectives (RAOs) and Cleanup Criteria; (2) Proposed Footprint of Remediation; and, (3) Proposed Electrical Resistive Heating (ERH) Remedy. A few additional comments outside these categories are also provided. We have attempted to keep our comments broad in scope and do not offer comments or suggested edits on grammar or syntax. In addition, our comments are not presented in any prioritized fashion.

**RAOs and Cleanup Criteria (RAO)**

**Comment RAO1:** The risk-based screening levels (RBSLs) discussed in the March 2005 GeoSyntec memorandum on Risk Based Concentration Calculations for the Vapor Intrusion Pathway, included as Exhibit 2 to the FS, incorporate consideration for the presence of a vapor barrier. These RBSLs are greater than concentrations currently detected on-site for trichloroethylene (TCE) and tetrachloroethylene (PCE). Thus, the RBSLs will not necessarily “drive” cleanup for volatile organic compounds (VOCs). While the driver for cleanup is the risk associated with constituents such as TCE and PCE in soil gas and soil, the language (page 20, Section 5.6.3.1 of the RAP) conflicts somewhat with the intent of the RAP because the RAP indicates that PCE is a driver for remediation (page 15, Section 5.2.2 of the RAP) yet the cleanup levels indicate that the Site does not need to be remediated for these constituents.

**DTSC Response RAO1:** The results of baseline risk assessment indicated that while both PCE and TCE were the primary VOCs that contributed the most to the cumulative risk estimates for the Site, PCE posed the greater risk to all of the receptors under future use scenarios. The language in Section 5.2.2 of the Draft RAP references the baseline risk assessment cumulative risk values noting these values were derived in the absence of remediation and engineered and/or land use controls and that these potential future exposures would require mitigation. Section 5.6.3.1 of the Draft RAP further expands on this point by describing the cleanup criteria for VOCs that include Source Zone remediation and inclusion of engineered controls to mitigate future exposures to VOC vapors. The RBSLs were derived for development scenarios assuming: 1) an engineered control (vapor barrier) in place; and 2) no engineered control in place. This dual approach allows for the evaluation of different development scenarios. The RBSLs derived assuming no vapor barrier is in place are lower than the existing soil gas concentrations on Site. This indicates that either remediation or engineered controls would be required to meet the RAOs. The RBSLs were not specified as the cleanup criteria for the Site; rather, they were intended to serve as a guide to determine what if any engineered controls may be required.

DTSC acknowledges that the language of the Draft RAP could be clearer in that the Draft RAP contains language indicating that with a vapor barrier, RBSLs derived in Exhibit 2 to the FS already are met without remediation. The RAP includes language to indicate that RBSLs without a vapor barrier are not met without performing remediation and that these RBSLs are therefore a driver for remediation.

**Comment RAO2.** The FS (and RAP) state that the cleanup goals for the various media are risk-based numbers. However, because no actual concentration goals are provided for the various constituents of concern, we are not certain that the proposed remedial action will meet the stated risk-based goals within the media of interest. Exhibit 2 to the FS is referenced but the values are not discussed in the body of the FS (or RAP) which creates confusion to the reader (page 18 of the RAP).

**DTSC Response RAO2:** Based on the Risk Assessment, a cleanup goal for PCBs of 17 mg/kg was established. This cleanup goal was used to determine how much soil needs to be excavated in the top 10 feet to be protective of future exposures that could occur during activities such as landscaping. Cleanup for VOCs, as discussed in Section 5.6.3.1 of the Draft RAP, is performance-based, focused on Source Zone remediation (In-situ electrical resistive heating) performed to the limit of the technology. This Source Zone remediation coupled with adequate engineered controls such as a vapor barrier, if required, will meet the risk-based RAOs for the Site. As discussed above, numeric RBSLs for PCE and TCE in soil gas were provided to evaluate various development scenarios and were not specified as numeric cleanup criteria. An assessment of whether remedial goals have been met will be performed through a post-remedy soil vapor survey. Through this survey, we will learn whether RBSLs for a mixed-use building without a vapor barrier have been met, or whether the vapor barrier is required to protect occupants of the building until soil vapor concentrations decline further. For groundwater, numeric goals have also been established as the Maximum Contaminant Levels (MCLs). Achieving that goal may require a long period of natural attenuation following the completion of active remediation. While natural attenuation is occurring, current receptors are not at significant risk from VOCs emanating from groundwater, based on the Risk Assessment.

The RAP has been revised to clarify the cleanup criteria. Specifically, Table 5-1 has been included to indicate how each remedial goal identified in the RAP will be met.

**Comment RAO3.** One RAO is to reduce risk from ingestion, inhalation, and dermal contact with soils to risk levels of less than $1 \times 10^{-5}$ for future landscapers and utility workers, but the cleanup criteria (page 20 of the RAP) represent levels for building occupants potentially exposed to vapors through floors, not to receptors who would be exposed to vapors via inhalation of vapors from open trenches or digging directly into the ground. These types of receptors may actually be the driver for remediation. If they are not, then the FS should address the residual risks and why they are not significant. In addition, while the RAOs indicate utility workers (page 17 of the RAP), the RA did not actually evaluate utility workers. BBL estimated that utility worker cancer risk for PCE and TCE could be $5 \times 10^{-5}$ or higher (not including other constituents) based on algorithms shown in U.S. Environmental Protection Agency's (USEPA's) Soil Screening Level Guidance (USEPA, 2002). While the landscape worker risks are an order of magnitude higher, they are driven by polychlorinated biphenyls (PCBs), not chlorinated solvents because as soon as vapors migrate to outdoor air they are diluted; whereas, trench workers are exposed to vapors that may accumulate in confined space air. Furthermore, the landscaper risks are correctly based on a 95 percent (%) upper confidence limit (UCL) because a landscaper could be exposed Site wide and, thus, the RAP indicates that the Site-wide PCB risk will be reduced with the excavation at the target remedial area. However, trench workers are not exposed Site-wide and thus PCBs would contribute to their overall risk as well. If you incorporate average concentrations of Aroclor 1254 with PCE and TCE, the cancer risk is $1x10^{-4}$ and the hazard index is 3. Therefore, excavating at the target remedial area will not reduce the trench worker risk.

**DTSC Response RAO3:** The focus of the risk-based evaluation conducted for the FS was on the landscaper as this was a receptor type that would likely contact soils in the future. In addition, the type of recurrent activity required by landscaping (weekly over many years) would be more intensive exposure than the shorter-term exposure that might be encountered by a utility worker (a small number of days over a shorter duration). For the Site, these short-term exposures could be managed through a Site soil management plan developed as part of a deed restriction.

An addendum has been included in the RAP (Exhibit 1) which provides a risk evaluation for a utility worker exposure scenario of a 20-day exposure duration during construction.

**Comment RAO4a:** According to the FS, the source zone cleanup criteria are: to apply an in-situ technology to destroy VOCs to the limit of the technology and to provide engineered controls to maintain risk factors within acceptable limits. We have several observations concerning this.

• How it was concluded that ERH, in combination with engineered controls, will reach acceptable risk factors was not articulated.

**DTSC Response RAO4a:** The goal of ERH is to reduce VOC concentrations by applying ERH to the limits of the technology. ERH will destroy the source of contamination in the Source Zone. The issue of human health risk through dermal exposure, inhalation and ingestion is addressed through other elements of the remedy, primarily excavation. The purpose for employing ERH as a remedial technology is to achieve Source Zone reduction consistent with current cleanup approaches for DNAPL sites. DTSC expects the Source Zone remedy approach to result in significant reduction in soil vapor contamination throughout the Site and in reduction of dissolved phase groundwater concentrations at the Source Zone, such that natural attenuation can be used to effectively reduce groundwater concentrations further until the MCLs for VOCs ultimately are achieved. The approved remedy requires monitoring of these natural attenuation processes through annual groundwater sampling. This monitoring would be conducted for a period of five years, until the five-year remedy review, or until the dissolved concentrations have shown an acceptable downward trend, as is expected post-remedy, whichever occurs first. The need for any further groundwater monitoring would be assessed and determined as part of the five-year review.

**Comment RAO4b:** Why combinations of source zone treatment options in the source zone were not considered is unclear.

**DTSC Response RAO4b:** Combinations of treatment options were considered in the FS, and Alternative 2, a combination of excavation and ERH, is being used in the Source Zone. ERH is expected to reduce VOC concentrations to very low levels. DTSC requested the development of a contingency plan if groundwater contaminants migrate from the Source Zone during the application of the treatment process. As the FS and Draft RAP set forth, such a contingency plan would include injection of chemical oxidant into wells within or downgradient of the Source Zone.

**Comment RAO4c:** As proposed in the FS (and RAP), the ERH technology does not appear to be contemplated for application to the limit of the technology. ERH is capable of treating a much larger area than proposed. If the intent is to apply ERH to the limit of the technology, than the proposed treatment area should be expanded from the 30-foot diameter circle currently assumed.

**DTSC Response RAO4c:** DTSC does not believe that it is necessary to expand the footprint of the ERH remedy. The extent of the remedy has been the subject of intensive study by DTSC and CDE over a long period of time. DTSC believes that, consistent with DNAPL guidance, it is appropriate to apply an active remedial approach that is targeted to the DNAPL form of Site contamination where that DNAPL is known to exist. Doing so at the Site will destroy contaminants within the Source Zone, where releases were known to occur. Within the Source Zone, the ERH technology will be applied to its practicable limits.

Even if the footprint of ERH were to be expanded, some DNAPL would in all likelihood still remain at the Site after remediation is complete, given its chemical properties. Following the cleanup activities, a post-remedy soil vapor survey will be conducted to evaluate residual concentrations and determine if engineered controls are required.

**Comment RAO4d*:*** Why the source zone cleanup criteria are not also linked to groundwater restoration is unclear. Ordinarily source zone remediation is considered to be a key component of a comprehensive groundwater restoration strategy.

**DTSC Response RAO4d:** The Source Zone cleanup criteria are linked to groundwater restoration. Refer to Sec. 7.3.3.1, 7.3.3.2, 7.3.3.5, 8.2.2, 8.2.4 and 8.2.5 of the FS, and Sec. 6.1.2, 6.3.1, 6.3.3, 7.1 and 7.2.3 of the Draft RAP. These documents explain that a key reason to employ ERH as a remedial technology is to achieve Source Zone reduction. DTSC expects that the Source Zone ERH remedy will result in significant reduction in dissolved phase groundwater VOC concentrations, such that natural attenuation can be used to effectively reduce groundwater concentrations further until the MCLs for VOCs ultimately are achieved.  That is a key linkage between Source Zone cleanup criteria and groundwater restoration.

Table 4-4 of the FS has been modified for inclusion into the RAP (as Table 5-1). The modified table more clearly states that MCLs are the remedial goal for groundwater at the Site.

**Comment RAO4e:** It is not clear why engineered controls are assumed, when such controls carry additional costs, stigma issues, and operation, maintenance and monitoring (OM&M) requirements for the property owner.

**DTSC Response RAO4e:** Due to the presence of DNAPL at the Site, the selected remedial approach is the most appropriate to address the DNAPL contamination.  Neither EPA nor DTSC has identified a remedial technology or combination of technologies that can be expected to remove all DNAPL at such sites.  The evaluation of ERH in the FS, however, was performed without the assumption of an engineered control.  DTSC will require that ERH be performed to the limit of the technology within the Source Zone.  It is possible, although not likely immediately, that the resultant soil vapor concentrations will be below the RBSLs identified for a mixed-use building without a vapor barrier.

Recognizing that such RBSLs may not be met through active remediation alone, DTSC will require that engineered controls be used as part of any mixed-use future development until soil vapor concentrations on the Site decline to levels that are deemed to be protective of occupants of a mixed-use development.

**Comment RAO4f:** Furthermore, the RAP states that the "installation of a vapor control system is typical for mixed-use building construction in the area of the Site, and indeed throughout Southern California."  We find this statement as misleading.  We believe that this is an effort to relate this Site to sites that are required to have vapor control systems because of the need to mitigate naturally occurring methane and other oilfield gases.  It is important to note that this Site does not fall into that requirement (and thus incurring the costs for installation of such systems will not be a "routine" requirement in any prospective future development plan for the Site) and, thus, vapor control systems should not be considered a "routine" component to future redevelopment of the Site.

**DTSC Response RAO4f:** DTSC recognizes that, although the Site is near the methane mitigation area in Venice, the Site is not within that area, and so would not require the use of methane mitigation measures.  However, DTSC has observed that various types of barriers are being installed at several mixed use development sites in the vicinity of the Site.  The RAP has been revised to clarify this.

CDE and the current Site owner will be required to work through issues such as the ones identified in this comment: cost, stigma, operation and maintenance, etc. It is DTSC's responsibility to ensure the proper Deed Restrictions are put in place if necessary based on the results of the post-remedial soil vapor survey.

**Comment RAO4g**: The RAP states that new buildings associated with the future use of the Site are expected to be constructed "…with underground parking" (page 18 of the RAP). However, an evaluation of the risks associated with underground parking construction and future use on this Site is not presented. The owners consider that underground parking will likely be an integral part of a future use scenario for the Site.

**DTSC Response RAO4g:** DTSC has examined whether a garage scenario would be permissible following cleanup, and is satisfied that a garage could be included in a development that includes a mixed-use building with first-floor residential use above the garage. The underground parking garage scenario has been included in a revised version of Exhibit 2 of the FS, which has been included in the RAP.

The previous discussion is focused on VOCs. To the extent the comment also refers to PCBs, the selected remedy includes excavation of PCBs above 17 ppm within the top ten feet of soil throughout the Site, and the excavation of a soil column 20 feet in diameter within the Source Zone to a depth of 20 feet below ground surface (bgs) in an area of high PCB concentrations. DTSC believes that very little PCB-contaminated soil requiring active management will remain at the Site after these remedial steps are taken. However, during actual excavation or grading of Site soils as part of Site development, DTSC expects that soil management approaches normal to any similar development, or as required by a Deed Restriction, would be followed. If isolated areas of soil contamination are discovered during development, DTSC would expect appropriate management techniques to be taken, consistent with state and federal regulation.

**Comment RAO4h:** We believe that the FS should also include an RAO to reduce the concentrations of VOCs in soil gas for the property adjacent to, and south of, the 4144 Glencoe Site to the extent that engineering control measures (sub-slab depressurization systems and vapor barriers) and associated institutional controls will not be required, and to the extent that residual VOC concentrations in soil gas at the adjacent property are within acceptable limits for all reasonable future land use exposure scenarios.

**DTSC Response RAO4h:** The Remedial Action Objectives (RAOs) outlined in the Draft RAP do address the issue of soil vapor contamination emanating from the Site, regardless of where that contamination may occur on Site. The soil vapor extraction (SVE) component of implementation of the ERH remedy at the Site will draw back soil vapor contaminants through the same pathways that the contamination initially spread.

**Comment RAO5a:** The FS states that groundwater cleanup criteria are: to manage the plume to meet risk-based factors, meet ecological risk standards, and protect the deep aquifer. We have multiple comments concerning this.

• It is not clear why groundwater cleanup criteria are not linked to the vapor intrusion pathway. While the FS asserts that there is an upper confining unit (i.e., clay lenses) that mitigate the transport of vapors to the surface, no quantitative analysis is offered to demonstrate that the shallowest groundwater could not pose a risk. Many of the CPT logs nearest to the mapped plume axis do not contain groundwater sample results from the water table zone (e.g., CPT-1, -4, -5, -B, and –C). Most of the CPT groundwater data were obtained over 10 feet below the water table. In a some circumstances (e.g., CPT-12), CPT data obtained within approximately 5-10 ft below the water table showed concentrations that could pose an indoor air issue (1.1 parts per million [ppm] PCE, 1.7 ppm TCE). The concentrations at the water table could be higher. Thus, the potential for a groundwater to indoor air pathway is not completely characterized. In addition, there is no analysis of the future off-site plume concentrations and their potential impact on indoor air concentrations for downgradient, off-site properties with ground-level residential or sensitive use receptors (e.g. daycare). The upper confining unit is limited in its extent and thus mitigation that may be occurring on-site may not occur off-site. While engineered controls may allow for the efficient transfer and redevelopment of the site, the assumption of engineered controls to mitigate the indoor air issue is presumptive (as stated above), and not necessarily in the best interest of the property owner or downgradient property owners. Off-site property owners may not be aware of potential for vapor intrusion from an off-site plume migrating beneath their property.

**DTSC Response RAO5a:** Extensive soil gas sampling was conducted to determine if concentrations pose a health risk in indoor air. Soil gas data are a better indicator of the threat to indoor air than groundwater samples. However, both soil gas data and groundwater data were used in the baseline risk assessment.

For residential exposures, the risk assessment evaluated potential exposures via vapor migration from groundwater at the nearest residential location. The exposure modeling that was conducted in the RA was conservative in nature and assumed residential exposure scenarios that were similar to a ground-level or single-family residential structure. This scenario was conservative because existing land uses in the vicinity of the Site include typically multi-family residential and mixed use commercial buildings. Even with this conservative modeling, estimated risks were below the residential risk level of $1 \times 10^{-6}$.

Additional information collected during the Site soil gas survey conducted in 2005 provides quantitative, Site-specific data that shows groundwater is not a significant source of VOC concentrations in vadose zone soil gas. Soil gas samples were collected at multiple depths at two locations immediately downgradient of the Site (CSV-37 and CSV-48). These vertical soil gas profiles overlie groundwater concentrations that are higher than concentrations in downgradient areas referred to in this comment. The data collected from these locations show that contaminant concentrations decrease with depth, with the lowest concentrations detected only slightly above the water table. These results are exactly opposite of what one would expect if groundwater off-gassing were a significant source of vadose zone soil gas concentrations. Furthermore, the soil gas concentrations directly overlying the water table were below levels that would be predicted to pose an unacceptable risk via the vapor intrusion pathway. DTSC therefore would not expect that lower groundwater VOC concentrations further from the Site would cause an unacceptable exposure. Soil gas observed at the adjacent properties is thought to be due to lateral migration of soil gas from shallow soil sources.

With respect to the depth of groundwater samples and the potential for higher concentrations in the uppermost water table zone, these comments are inaccurate: three of the five referenced sampling locations have samples collected from the water table zone, and at 11 of the 13 locations where samples were collected from multiple depths, lower concentrations were found in the water table zone than in the underlying zone. Depth to groundwater beneath the Site is approximately 20 feet below ground surface (bgs)[1]. It is reasonable to define the "water table zone" as the vertical interval within 10 feet of the water table surface. Therefore, the water table zone at the Site can reasonably be defined as occurring from 20 feet to 30 feet bgs.

Groundwater samples were collected from the water table zone in 17 of 31 sampled locations, and from multiple depths at 13 of the 17 locations where water table zone samples were collected. At 12 locations, discrete-depth samples were collected from both the water table zone and the underlying zone. At 9 of these 12 locations, PCE concentrations from the water table zone were lower than PCE concentrations from the underlying zone; at 10 of these 12 locations, TCE concentrations from the water table zone were lower than TCE concentrations from the underlying zone. These data support the conclusion that PCE and TCE concentrations in the water table zone are lower than in the underlying zone.

For these reasons, it was determined that groundwater cleanup criteria are based on the limits of the remedial technology in destroying DNAPL, which will then reduce dissolved concentrations in the Source Zone and ultimately achieve MCLs.

[1] The depth to groundwater, as measured in groundwater Monitoring Wells BH-15 and BH-18 on the dates of CPT water sampling, was 20 feet bgs.

**Comment RAO5b:** It is not clear that the FS considered potential exposure to VOCs in groundwater (by on-site or off-site receptors) as may occur in a dewatering scenario with a deep excavation into the saturated zone within the footprint of the plume.

**DTSC Response RAO5b:** Potential exposures to groundwater from a deep excavation during construction of a future development on the property were not considered. Contact with groundwater on the property is not considered to be a reasonable exposure associated with the anticipated type of future Site development. However, a Deed Restriction will be put in place to ensure future land use prevents exposure to VOCs in groundwater.

Regarding the downgradient groundwater plume, DTSC is aware that dewatering is occurring at one location. At this location, the groundwater is pumped through granular, activated carbon and discharged in accordance with a NPDES permit. Based on the risk assessment conducted for the Site, current off-property receptors are not at significant risk from VOCs emanating from groundwater, including in a dewatering scenario.

**Comment RAO5c:** It is not clear that the FS considered potential exposure to VOCs vapors (by on-site or off-site receptors) as may occur in a deep excavation (e.g., for an underground parking scenario) into the unsaturated zone within the footprint of the plume.

**DTSC Response RAO5c:** In DTSC Response 4g, Exhibit 2 in the FS which is a memo dated March 30, 2005 was referenced. The March 30 memo provides a qualitative analysis for examination of development scenarios. In particular, DTSC qualitatively reviewed the development of a garage scenario and concluded that it would be permissible within this framework. A garage could be included in a development that includes a mixed-use building with first-floor residential use above the garage. The underground parking garage scenario has been discussed in a revised version of Exhibit 2 of the FS, which has been included in the RAP. Based on post-remedial Site conditions, appropriate Deed Restrictions will be put in place, with requirements regarding vapor controls and soil management during Site development.

Regarding off-property receptors, the same approach outlined in Exhibit 2 of the FS could be utilized by a future developer to determine appropriate development alternatives.

**Comment RAO5d:** How will the potential off-site receptors (under the scenarios described above) within the footprint of a lingering VOC plume in groundwater be notified of potential exposures to VOCs?

**DTSC Response RAO5d:** Potential exposures to VOCs in groundwater could occur for off-property receptors through the following pathways: 1) through a vapor pathway from groundwater off-gassing; 2) from a deep excavation during construction of a future development; and 3) through ingestion of drinking water. Each of these is addressed below.

With regard to the vapor pathway from groundwater off-gassing, the RI and supplemental investigations on the property and adjacent properties do not indicate that groundwater off-gassing is a significant contributor to soil vapor. There is evidence of a continuous low-permeability layer above the groundwater table that significantly attenuates the migration of VOCs toward the ground surface. This attenuation mechanism will continue protecting overlying receptors at the surface as groundwater VOC concentrations decrease following implementation of the remedy. Based on the risk assessment, current off-property receptors are not at significant risk from VOCs emanating from groundwater.

Regarding exposures to VOCs in groundwater in a deep excavation, please see DTSC Response RAO5b and RAO5c.

With regard to ingestion of groundwater, DTSC recognizes that the shallow aquifer is designated for municipal use, but is not currently being used for drinking water purposes. Any off-property receptor who may propose a drinking water well in the shallow aquifer would first need to obtain a permit from the California Department of Health Services and from the City of Los Angeles, which would not be granted due to the groundwater's current state.

Based on this information, DTSC believes that existing mechanisms at the Site are adequate to protect off-property receptors from potential exposure to VOCs in groundwater without additional notification mechanisms.

**Comment RAO5e:** The plume has not been delineated in its downgradient extent, so the degree to which the plume meets eco-risk standards is unclear.

**DTSC Response RAO5e:** Potential ecological exposures were evaluated using the furthest downgradient concentration data that were available. These data were collected several hundred feet upgradient of any ecological habitat such as the Ballona Creek and Marina. To evaluate potential ecological exposures, the maximum detected concentrations of chemicals in the furthest downgradient CPT locations were compared to risk-based ecological screening values for each chemical detected in the groundwater sampling. The results of the screening indicated that chemical concentrations were well below the chronic screening criteria, which indicated that current chemical concentrations at the furthest downgradient monitoring points would not adversely impact aquatic receptors. Ongoing groundwater monitoring will be conducted after cleanup activities have been completed to verify this conclusion.

**Comment RAO5f:** The FS (and RAP) do not present any evidence that the plume has reached steady state. Thus, it is possible that future human health and ecological risks associated with the plume could increase.

**DTSC Response RAO5f:** The future human health and ecological risks were assessed based on existing concentration distribution data and the nearest receptor, respectively. The remedy includes downgradient monitoring to assess time-series dissolved phase contaminant concentrations. If monitoring results show a significant increase in dissolved phase concentrations, the Draft RAP describes that DTSC would require implementation of a contingency plan that would include assessment of risk; implementation of appropriate steps would follow based on the risk findings.

**Comment RAO5g:** The FS (and RAP) do not present any basis to evaluate whether, to what extent, and within what timeframe the proposed ERH remedy will affect the downgradient VOC plume concentrations, if at all.

**DTSC Response RAO5g:** Regulatory guidance documents (EPA DNAPL Challenge) and recent studies (see below) indicate that although complete DNAPL removal is impossible to achieve, source mass removal will reduce the lifespan of the dissolved phase plume. Even if complete source removal could be achieved, a dissolved phase VOC plume typically will continue for many years after the source material is removed. This is well documented. For example, Chapman and Parker (2005) describe the process by which dissolved phase contaminants first diffuse to fine-grained sediments throughout the dissolved phase plume, and then diffuse out of the fine-grained sediments after source depletion or isolation, a process known as back diffusion. As Chapman and Parker (2005) concluded:

> "… vertical back diffusion from the aquitard combined with horizontal advection and vertical transverse dispersion account for the TCE distribution in the aquifer and that the aquifer TCE will remain much above the MCL for centuries."
>
> Chapman, S. W., and B. L. Parker (2005), Plume Persistence Due to Aquitard Back Diffusion Following Dense Nonaqueous Phase Liquid Source Removal or Isolation, *Water Resources Research, Vol*, *41.*

Thus, even if the remedy could remove 100% of the source mass (DNAPL), the dissolved phase plume would remain above the MCL for many years. The lifespan of the dissolved phase plume cannot be estimated without knowing the mass of contaminants that has diffused into the aquitards throughout the dissolved phase plume, which is technically impracticable.

**Comment RAO6:** One of the groundwater cleanup criteria is to "protect the deep aquifer", but it has not been demonstrated that the proposed remedy will be protective.

**DTSC Response RAO6:** The findings of the Remedial Investigation (RI) showed that the deep groundwater aquifer, referred to as the "C Aquifer" is not impacted by Site contaminants. No C Aquifer well installed during the RI showed detectable levels of VOC contaminants. At the Site, a geologic feature is present between the C Aquifer and the overlying contaminated B Aquifer that is a thick confining layer. This confining layer is continuous across the Site. During assessment of this confining layer in the RI, VOC contamination was shown to have penetrated only a small fraction of the total vertical extent of this confining layer that separates the B Aquifer from the C Aquifer. The active remedial step of ERH within the Source Zone will remove DNAPL that could continue to pose a threat to the C Aquifer. This active approach will be combined with a requirement for continued monitoring of groundwater in the C Aquifer to demonstrate that the C Aquifer remains unaffected. If, at some future time, VOCs are detected in these C Aquifer wells, that condition would warrant additional investigation. Please also see DTSC Response RAO5d.

**Proposed Footprint of Remediation (PFR)**

**Comment PFR1:** Within and outside the footprint of the ERH remedial action, TCE and PCE in groundwater are expected to reach maximum contaminant levels (MCLs) through natural attenuation over time. We believe it will take a very long time for the residual concentrations in groundwater post-remediation to actually reach MCLs. No modeling or calculations are presented in the FS or RAP regarding the transport of dissolved-phase chlorinated solvents, and potential long-term fate of the elevated concentrations that continue to migrate off-site. In addition, there is no indication of the risk associated with direct contact with groundwater by construction/utility workers who may contact groundwater directly if a subsurface garage were installed on the property.

**DTSC Response PFR1:** DTSC agrees that it will take a long time until groundwater VOC concentrations at the Site decline to the MCLs. During the RI, the nature and extent of contamination in groundwater at the Site was characterized. The active remedial step of ERH will result in a significant improvement in the dissolved phase VOC concentrations in groundwater, and it is highly unlikely that the application of this remedy will cause increased groundwater concentrations to occur off-property. However, groundwater monitoring is an important part of the remedial approach to assess the trend in dissolved phase groundwater VOC concentrations post-remedy. If an increase in groundwater VOC concentrations occurs, implementation of a contingency plan that would include assessment of risk would be required.

As explained in DTSC Response RAO5d, the risk assessment indicates the risk of exposure to VOCs in groundwater currently is acceptable.  A Deed Restriction will be required for the Site restricting the withdrawal of groundwater for drinking water purposes until such time as the aquifer achieves MCLs for contaminants. DTSC understands that the Site owner is concerned about a development scenario that could include construction/utility worker exposure to groundwater. The RAP has been revised to include an assessment of the potential risk associated with this scenario.  Appropriate deed restrictions will include protections for construction/utility workers who could potentially contact groundwater (e.g., restricting certain excavation scenarios unless DTSC is contacted and can therefore require the use of appropriate protective measures.)

**Comment PFR2a:** Figures 3-12, 6-5, and 6-6. Although these figures suggest that the dense non-aqueous phase liquid (DNAPL) source is within a 30-foot diameter circle, some of the site data and general principles regarding DNAPL migration in porous media suggest that DNAPL is also present beyond the limits of the circle.

We recognize that detailed delineation and characterization of non-aqueous phase liquid (NAPL) pools and zones containing residual NAPL are not possible with available investigative technologies (Pankow and Cherry, 1996; Cohen and Mercer, 1993). At best, the three-dimensional extent of NAPL in the subsurface can be inferred using indirect indicators of NAPL presence, in conjunction with the chance incidence of direct NAPL observation and sampling.  A NAPL zone can be inferred based on NAPL constituent effective solubility analysis versus ground-water concentrations (Feenstra et al, November 1991; Cohen and Mercer, 1993; Pankow and Cherry, 1996).  NAPL presence is strongly suggested and can reasonably be expected to exist in immediate proximity to any monitoring well exhibiting VOC concentrations greater than 1% of the VOC effective solubility within and downstream of known or suspected NAPL release locations (WCGR, 1991; USEPA, 1992; Cohen and Mercer, 1993; Pankow and Cherry, 1996). Given this information, the following data are noteworthy.

**DTSC Response PFR2a:**  It is recognized that complete DNAPL distribution is effectively impossible to delineate (EPA, 2003).  In fact, in their comparison of DNAPL characterization methods and approaches, Kram et al. (2001) state:

> "This complex mode of subsurface transport results in unpredictable heterogeneous distribution of nonaqueous product that is difficult to delineate."  Although there are many tools that can be used in the identification and characterization of DANPL, each has its strengths and weaknesses.  It is for this reason that multiple lines of evidence were used to identify the area where DNAPL is likely present.

Kram, M.L., Keller, A.A., Rossabi, J., and Everett, L.G., 2001. DNAPL Characterization Methods and Approaches, Part 1: Performance Comparisons. Ground Water Monitoring & Remediation, Volume XXI, No. 4, Fall 2001.

With respect to relying on the 1% of the effective solubility rule of thumb, Kram et al. caution:

> "The 1% 'rule of thumb' must be cautiously applied since the dissolved plume emanating from large source zones may exhibit dissolved concentrations above 1% for a substantial distance downgradient of source".

DTSC recognizes that there will be some portion of DNAPL that is present outside the area of Source Zone remediation. However, the area within which DNAPL likely resides is based on multiple lines of evidence derived from multiple sampling methodologies.

**Comment PFR2b:** Approximately 30 feet northwest of (and cross-gradient from) the 30-foot circle proposed for ERH remediation, groundwater at monitoring well MW-3-P contained 37 ppm of TCE, which is over 3% of its pure-phase solubility. PCE was also detected at 22 ppm, which is 15% of its pure phase solubility. Based on these data, it can be deduced that the percentage of effective solubility of these compounds, accounting for the solubility effects related to mixed organic compounds, is approximately 18%.

**DTSC Response PFR2b**: As indicated above, the area proposed for ERH remediation was based on multiple lines of evidence in addition to dissolved phase concentrations. In the area addressed by this question, additional lines of evidence include soil borings and soil gas. Boring BH-34 is located approximately 10 feet south of MW-3-P. PCE concentrations were less than 0.5 mg/kg in soil samples collected from depths of 0.5, 5, 10, 12.5, and 20 ft bgs in BH-34. PCE was ND in the sample collected from 20 ft bgs, which is just above the groundwater table where we would expect high concentrations if DNAPL were present nearby upgradient. This indirect line of evidence does not suggest that DNAPL is present in that area.

Soil gas sampling point SV-52 is located approximately 7 feet north of MW-3-P. The PCE soil vapor concentration in SV-52 was 36.9 µg/L. This is a very low soil vapor concentration and this indirect line of evidence does not suggest that DNAPL is present in that area. However, as stated above, DTSC recognizes that there will be some portion of DNAPL that is present outside the area of Source Zone remediation.

**Comment PFR2c:** Approximately 80 feet southeast of the 30-foot circle, groundwater at cone penetrometer boring CPT-1 contained 170 ppm of TCE

(16% of solubility) and PCE at 40 ppm (27% of pure-phase solubility). Based on these data, it can be deduced that the percentage of effective solubility of these compounds, accounting for the solubility effects related to mixed organic compounds, is approximately 42%.

**DTSC Response PFR2c**: As indicated above, DTSC believes that the 1% 'rule of thumb' must be cautiously applied, and should be corroborated by additional lines of evidence. In the area in question, additional lines of evidence are derived from soil borings and Membrane Interphase Probes **(**MIPs). Additionally, CPT data represent a single sampling event that is not reproducible. Groundwater data developed from monitoring wells are generally regarded as more indicative of subsurface conditions because of their reproducibility.

BH-18 is located within 5 feet of CPT-1, from which one soil sample was collected from a depth of 15 ft bgs.
PCE was not detected in this soil sample. This indirect line of evidence does not suggest that DNAPL is present in that area.

Nine MIPs were advanced in the vicinity surrounding CPT-1, the closest of which is about 15 feet southeast of CPT-1. MIPs are located between CPT-1 and the area where DNAPL has been confirmed (upgradient). These MIP results are an indirect line of evidence suggesting that DNAPL is not present in that area.

Borings BH-26, BH-27, and URS-B2 (URS-2) were advanced north, west, and northeast of CPT-1. Combined, twenty two soil samples were collected from these three borings, of which 11 were from the vadose zone. The highest PCE concentration detected in these samples was 0.92 mg/kg at a depth of 20 ft bgs (at the groundwater table). In the borings west and north of CPT-1 PCE concentrations were low above the water table. These data are an indirect line of evidence suggesting that DNAPL is not present in that area.

The location of CPT-1 is less than 60 feet directly downgradient of where DNAPL is inferred to exist. The groundwater grab sample was collected from a discrete coarse grained zone (34 to 39 ft bgs). Thus, it is not surprising to see PCE concentrations in groundwater that are similar to groundwater concentrations in the Source Zone. The presence of high PCE concentrations in MW-3-P can be explained by proximity to the Source Zone. Additionally, groundwater samples collected from BH-18 are more than an order of magnitude lower than the concentration detected in CPT-1. Although groundwater concentrations in BH-18 are at the 1% threshold concentration, these data do not represent a new or different indirect line of evidence that can be used to corroborate the CPT-1 data.

**Comment PFR2d:** Approximately 160 feet south of the 30-foot circle, groundwater at cone penetrometer boring CPT-C contained 140 ppm of TCE (13% of solubility) and PCE at 41 ppm (27% of pure-phase solubility). Based on these data, it can be deduced that the percentage of effective solubility of these compounds, accounting for the solubility effects related to mixed organic compounds, is approximately 40%.

Based on these calculations, it is probable that some DNAPL exists in the immediate vicinity of well MW-3-P, and borings CPT-1 and CPT-C.

**DTSC Response PFR2d**: As indicated above, the 1% ‘rule of thumb’ must be cautiously applied, and should be corroborated by additional lines of evidence. In the area in question, additional groundwater data are available from the cited location, CPT-C. Groundwater samples were collected from discrete-depth intervals from 25 – 30 feet bgs, 34 – 38 feet bgs, 40 – 44 feet bgs, and 47 – 52.5 feet bgs. The detected PCE concentrations from shallowest to deepest were 0.04 ppm, 41 ppm, 0.65 ppm, and 0.37 ppm, respectively. This indirect line of evidence does not suggest that DNAPL is present in that area. Rather, the data suggest high dissolved phase concentrations emanating from the Source Zone and migrating downgradient in a narrow vertical channel from 34 – 38 feet bgs.

**Comment PFR2e:** NAPL migration on a small scale is expected to be highly irregular, erratic, and extremely difficult to predict accurately due to small-scale permeability variations. As a result, it is common for DNAPL zones to extend further in the horizontal than the vertical direction. At the 4144 Glencoe Avenue property, soil boring data and CPT data demonstrate that the A/B aquifer contains numerous fine-grained layers that would cause DNAPL to spread laterally. Regardless of the dimensions of the NAPL zone that may be estimated at first approximation based on groundwater quality data, NAPL can be reasonably assumed to have migrated beyond the probable NAPL zone within a number of isolated geologic laminae, strata, lenses, or channels near the periphery of the NAPL zone. While such incidences may represent a relatively minor fraction of the total NAPL volume at the site, NAPL within these zones could substantially impact the practicability of ground-water restoration within the surrounding formation. Based on these considerations, it is considered prudent to define a remedial zone that includes a “buffer zone”, similar to an engineering safety factor, around the perimeter where NAPL presence is most strongly evident. Such an approach is warranted due to the highly uncertain nature of NAPL distribution.

In this context, the proposed zone targeted for ERH remediation, a cylinder 30-feet in diameter and 50 feet deep, which does not contain all of DNAPL-indicative concentrations, seems highly unusual and likely much too limited, particularly in the horizontal dimension.

**DTSC Response PFR2e:** The relationship between the vertical and horizontal distribution is inaccurately characterized in this comment. The relationship between the vertical and horizontal distribution is based on many factors such as thickness of vadose zone, density of DNAPL, permeability of sediments, volume of release, and others. As reflected in previous responses, and supported by the literature cited, there are inherent shortcomings in fully characterizing the lateral extent of DNAPL migration. The remedy explicitly states that some DNAPL will likely not be addressed by the ERH remedy. DTSC concurs with the comment that the small mass that occurs beyond the perimeter of the ERH may substantially impact the practicability of groundwater restoration. However, DTSC notes that EPA states:

> “Once in the subsurface, it is difficult or impossible to recover all of the trapped residual DNAPL. The conventional aquifer remediation approach, groundwater pump-and-treat, usually removes only a small fraction of trapped residual DNAPL. Although many DNAPL removal technologies are currently being tested, to date there have been no field demonstrations where sufficient DNAPL has been successfully recovered from the subsurface to return the aquifer to drinking water quality.”
>
> USEPA. Estimating Potential for Occurrence of DNAPL at Superfund Sites. 1992.

It is precisely for these reasons that it is equally impractical to define a remedial zone that includes a “buffer zone”. It is not prudent to apply the remedy in areas where DNAPL has not been detected, nor can DNAPL be reasonably assumed to exist.

**Comment PFR3.** Leaving aside the question of DNAPL delineation, it is clear that elevated dissolved VOC concentrations exist outside of the proposed ERH remediation zone. These concentrations, up to 170 ppm of TCE, have been detected in thin, relatively sandy layers bounded above and below by relatively fine grained layers containing silt and/or clay. Although groundwater flow rates are likely to be low within the fine-grained layers, VOCs are likely to have migrated upward and/or downward into these layers from the sandy zones via molecular diffusion, which is driven by concentration gradients rather than groundwater flow. In the initial stages of plume advance in stratified media, such as the A/B aquifer at the site, constituent concentrations are high in the more permeable layers where ground-water advection predominates. Initially, little or no constituent mass exists within the fine-grained layers. However, due to the strong concentration gradient between the permeable layers and the fine-grained layers, constituents migrate into the fine-grained layers via molecular diffusion. The initial transfer of constituent mass into the fine-grained layers is relatively rapid during plume advance because of the strong initial concentration gradient from the permeable layers into the fine-grained layers.

Even if all of the DNAPL is within the proposed ERH remediation zone (which is considered highly unlikely), it could take many years for the dissolved plume downgradient of the proposed ERH zone to approach typical groundwater cleanup goals. During natural flushing or remediation of a plume in stratified media, the concentration gradient eventually reverses direction and constituents begin to diffuse back out of the fine-grained layers into the permeable layers. The constituent mass flux out of the fine grained layers due to diffusion, however, is significantly lower than the mass flux into them during the initial advance of the plume (Pankow and Cherry, 1996). During natural or remediation-enhanced flushing, constituent concentrations remain relatively high in the permeable layers. Thus, the concentration gradient and the VOC mass flux from the fine-grained layers to the permeable layers remains limited (Gorelick et al., 1993). Also, because the fine grained layers tend to have higher natural organic carbon content than the permeable layers, the fine-grained layers may serve as persistent reservoirs from which VOCs slowly desorb and diffuse back to the permeable layers. Ground-water restoration in this case would be controlled by reverse diffusion and desorption from the fine-grained layers. Thus, even if DNAPL is not present outside of the proposed ERH remediation zone, the proposed ERH remedy may not produce any significant reduction in dissolved VOC concentrations within a reasonable timeframe.

**DTSC Response PFR3:** DTSC agrees that a significant amount of time may be required for dissolved phase VOC concentrations to decrease below the MCL. However, the combination of aggressive remediation of the Source Zone, engineering controls, natural attenuation, and monitoring will ensure that the remedy will be sufficiently protective of human health and the environment. Please also see DTSC Responses RAO5d and RAO5g.

**Comment PFR4.** Outside of the proposed “source area” treatment zone, several groundwater samples were obtained that have concentrations over 100,000 parts per billion (ppb), which is ordinarily considered to be high enough to be within the groundwater zone requiring remediation. The area containing these locations is approximately 20 times larger than the proposed 30-ft diameter ERH circle (approximately 13,000 square feet versus 700 square feet). The FS (and RAP) do not present any analysis to suggest whether, to what extent, and within what timeframe the ERH remedy will affect the downgradient plume, and no analysis is provided to demonstrate that the plume is not currently growing at its downgradient extent. However, if only 5% of the area containing VOCs over 100,000 ppb is treated, it is unlikely that the ERH remedy will have any measurable effect on the concentrations within the downgradient plume within the foreseeable future.

**DTSC Response PFR4:** Please see DTSC Response RAO5g.

**Comment PFR5.** The proposed 20-foot auger excavation is shown extending to a depth of approximately 20 feet below grade. PCB concentrations up to 1,200 ppm also extended from 20 to 30 feet below grade. Although selective soil excavations, including deep auger excavation, may “mitigate the potential for PCB-impacted soil to degrade groundwater” to some degree, the PCBs that are already within the saturated zone are not addressed by the proposed remedy.

**DTSC Response PFR5:** During the RI/FS, an evaluation of PCBs in both soil and groundwater was conducted to determine if PCBs at the Site pose either a health risk or a potential to migrate to groundwater. Early groundwater monitoring wells had shown evidence of potential PCBs associated with sediments in the groundwater. Subsequent sampling indicated PCBs were not present in the dissolved phase of groundwater. This indicates groundwater is not being degraded by PCBs at the source or downgradient.

**Proposed ERH Remedy (ERHR)**

**Comment ERHR1.** The proposed ERH remedy covers an area of approximately 700 square feet (30 feet diameter circle). PCBs have been detected in several locations outside of the proposed treatment area. Given that PCBs sorb strongly to soil and are nearly immobile in groundwater, this raises the question of whether PCBs migrated as part of a multi-component DNAPL, as may occur with various types of NAPLs being released in close proximity. We understand that the inferred source area selected for ERH treatment corresponds with the location of a former depression in the ground surface, where source materials were placed. Given this conceptual source history, it is possible that the PCB distribution provides a useful, additional basis to infer the potential extent of DNAPL.

**DTSC Response ERHR1:** DTSC concurs with this comment. The distribution of PCBs in soil was used as a line of evidence to support the location of the ERH remedy, and investigation for DNAPL was conducted in areas of high PCB concentrations. However, outside the Source Zone, no correlation between DNAPL and high PCB concentrations was found to exist.

**Comment ERHR2.** BBL has conducted a detailed review of thermal remediation pilot and full-scale field demonstrations, including 22 ERH projects. The review summarized information regarding the area, depth, geology, target compounds, and cost of each project, in addition to other information. If implemented, the proposed ERH remedy considered in the RAP would be the smallest full-scale ERH remedy we are aware of (approximately 1,400 cubic yards [cy]). One pilot-scale ERH project was approximately 6.8 times larger (9,500 cy at a site in Kevil, Kentucky). On this basis, and given the comments above, the ERH zone contemplated in the reviewed FS report appears suitable as a potential pilot-scale project to evaluate the technology at the 4144 Glencoe Avenue Site, but it is not considered adequate to provide full-scale remediation of the potential DNAPL zone.

**DTSC Response ERHR2:** DTSC uses a site-specific approach in the process of investigation and remediation of sites. Through a comprehensive RI/FS at this Site, ERH was determined to be the most appropriate remedial alternative.

There is no information to indicate that the use of ERH at the Site would fail or be compromised because of the size of its footprint.

**Comment ERHR3.** ERH costs can vary widely based on depth, area, site accessibility, etc., and it would be useful to obtain a cost estimate from ERH vendors before reaching conclusions about the potential cost of ERH at the site. In the FS, the unit cost of the proposed ERH remedy is approximately $357/cy. This cost would be the third highest of 15 projects for which we have cost information, which suggests that the FS unit cost estimate could be considered conservatively high. The only ERH project in California that we reviewed was completed in 2000 in Newark; it was a pilot ERH project with a target zone of 600 cy and a cost of $142/cy. Because of economies of scale and further experience with the technology, it is possible that the full-scale unit cost at the 4144 Glencoe Avenue Site could be less than this. Qualified vendors should provide budgetary cost estimates to better refine the potential cost of ERH at the site.

**DTSC Response ERHR3:** As is shown in a footnote on Table 6-3 of the Draft RAP (Final Remedial Alternative 2 – Detailed Cost Summary), the cost of the proposed ERH remedy at the Site is based on a preliminary quotation obtained from a qualified ERH vendor who was presented with relevant Site data. That approach is consistent with EPA's guidance:

> "Cost data can be selected from a variety of sources, including:
>
> - Cost estimating guides/references
> - Vendor or contractor quotes
> - Experience with similar projects
> - Cost estimating software/databases."
>
> USEPA. "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study". Sec. 5.3. July 2000.

**Comment ERHR4.** The purpose for the proposed ERH remedy is still unclear.

• From one of our discussions with DTSC staff and counsel, we understand that a primary reason for ERH, was to remove VOCs from a section of soils containing PCBs, to make the PCB-soil excavation "safer", with less risk of VOC exposure.
• In the RAP (and FS), the ostensible purpose for the ERH remedy is to treat the VOC source zone to mitigate potential indoor air inhalation of VOCs.
• During a meeting between BBL and GeoSyntec on December 6, 2005, GeoSyntec indicated that the primary purpose of the ERH remedy is to promote and enhance groundwater remediation.

It is surprising that there may be still be a lack of clarity regarding the purpose of ERH. The indication that the indoor air exposure pathway is not the primary concern, contradicts the ostensible purpose for ERH according to the RAP (and FS). If the purpose of the ERH remedy relates solely to safe PCB excavation and vapor-intrusion mitigation, then it is not clear why the proposed ERH zone extends to 50 feet below grade, 30 feet deeper than the proposed deep auger excavation for PCBs.

The RAP (and FS) implies that the proposed ERH remedy will help mitigate the vapor-intrusion pathway. We find this confusing because at the 5 feet depth interval, TCE concentrations in soil vapor inside the proposed ERH area are 17 times lower than concentrations outside of the proposed circle. Similarly at the 5 feet depth interval, the PCE concentrations in soil vapor inside the proposed ERH area are 130 times lower than concentrations outside of the proposed circle. If the ERH remedy is supposed to mitigate the vapor intrusion pathway, then the available data suggest that the proposed ERH footprint should be expanded to encompass all of the areas containing even higher soil vapor concentrations. In other words, why is an area of lower soil vapor concentrations targeted for remediation if the purpose is to reduce soil vapor concentrations?

If the purpose of the proposed remedy is to enhance groundwater plume attenuation, we believe the scope of the remedy is too small to provide a measurable benefit, as discussed above; the FS and RAP provided no calculations or modeling to suggest otherwise.

**DTSC Response ERHR4:** In the Draft RAP Section 6.1.2, the stated purpose for ERH is "mass removal of PCE and TCE in the Source Zone, which includes vadose zone and saturated zone VOCs". This purpose, as is documented throughout the Draft RAP, facilitates Source Zone reduction within the framework of current approaches for DNAPL sites. Several connections were made in the Draft RAP between ERH and other issues at the Site, such as soil gas reduction. But the stated purpose of ERH is to employ a remedy that is consistent with Site data and with established remedial approaches at DNAPL sites. While the shallow soils in the Source Zone may not be significantly contaminated, deeper soils are, and the ERH will mitigate indoor air impacts of VOCs diffusing from these soils.

**Additional Comments (AC)**

**Comment AC1.** Site Redevelopment: There is overemphasized discussion on future use/redevelopment of the property (based on changes in neighborhood). This implies that the property will be demolished and/or redeveloped when there is no contractual obligation to do so at this time and thus is misleading to the public (page 4 of FS, page 58 of FS [footnote] – explicitly stated, and page 5 of Exhibit 2 to the FS).

**DTSC Response AC1:** It is appropriate, given the likelihood of contamination remaining at the Site post-remedy, to anticipate a reasonable future land use and examine whether it can be constructed safely.  There is no requirement for a contractual obligation to be in place for this approach.  In addition, EPA's guidance document "*Land Use in the CERCLA Remedy Selection Process*" also expressly states that it is appropriate to look at surrounding land uses in making assumptions about likely future use as part of the remedy selection process. Since the future land use scenario is not known, a reasonable assumption was made about future use based on preliminary information provided by the owners and the pattern of development in the area, which is in line with EPA's recommended approach.  As stated in the introduction and in previous comments, a Deed Restriction will be put in place to ensure future land use is protective of the health of Site receptors.

**Comment AC2.** Groundwater Monitoring.  Annual sampling for 5 years may be reasonable only if there are no significant changes in influences to the groundwater regime (local dewatering, significant change in groundwater levels, etc.) or if statistical trend analysis suggests that more frequent sampling is indicated.

**DTSC Response AC2:**  The RAP has been revised to state groundwater monitoring will be conducted on a more frequent basis for the first year following implementation of the remedy.  Based on the results, monitoring frequency will be evaluated.

**Comment AC3.** It is not clear to what extent the California Regional Water Quality Control Board – Los Angeles Region (Regional Board) has been consulted concerning the appropriateness of the proposed cleanup criteria, the selected remedy for this Site, and the post-remediation groundwater quality. We believe that it is prudent to engage and consult with the Regional Board on the nature and scope of the remedy for groundwater before final approval by DTSC.

**DTSC Response AC3:**  DTSC has consulted with the RWQCB regarding the Site.  The RWQCB has deferred decisions regarding investigation and remediation of this Site to DTSC.

**Comment AC4.** ARARs: We appreciate that the Antidegradation Policy is evaluated as an ARAR on pages 10 and 11 of Table 7-2 of the FS, but it is not clear whether the basis for a waiver to the policy has been satisfactorily demonstrated.

**DTSC Response AC4:**  The comment provided in Table 7-2 of the FS states that a waiver of the Antidegradation Policy may be appropriate if attainment is impracticable for several reasons, including the difficulty, excessive timeframe, and cost for removing DNAPL.  It is premature to determine whether the Site meets the requirements for a waiver from the Antidegradation Policy.  The stated goal of the Site remedy, which includes monitored natural attenuation, is to achieve the MCLs for VOCs in groundwater.  Results of post-remedial groundwater monitoring will provide the basis for which the appropriateness of a waiver of the Antidegradation Policy is determined.

# EXHIBIT 1

# EVALUATION OF POTENTIAL EXPOSURES TO SOIL DURING DEVELOPMENT

# EXHIBIT 1

# EVALUATION OF POTENTIAL EXPOSURES TO SOIL DURING DEVELOPMENT

As part of the remedial planning for the Site, additional potential exposures were evaluated. Specifically, these potential exposures relate to activities that may hypothetically occur during redevelopment of the Site and include potential utility/trench worker exposure to PCBs and PCE/TCE in soil via direct contact and inhalation pathways. Although this exposure is being evaluated with respect to risk assessment, it is anticipated that potential exposure to utility/trench workers would be minimized by adherence to Health and Safety plans required for work on the Site during redevelopment as a part of the Soil Management Plan for the Site.

To evaluate potential risks via these pathways, conservative assumptions were made regarding the post-remediation concentration that will be remaining in soil and groundwater. For PCBs in shallow soils (less than or equal to 10 feet below ground surface (bgs), it was assumed that the maximum concentration that would be present was equal to the cleanup criterion of 17 mg/kg. For PCE and TCE in shallow soils, the concentrations were assumed to be 280 mg/kg and 410 mg/kg, respectively. These concentrations reflect what may be present outside the shallow soil excavation that will take place at the Site and are observed in boring BH-24. Appropriate information supporting the calculations in this exhibit is included as Attachment 1.

## Exposure Parameters

Exposure is calculated separately for assessing cancer risk versus noncancer hazard. The exposure parameters and references that were used in this evaluation to estimate cancer risk and non-cancer hazard for utility/trench workers are presented in Table 1.

## Toxicity Criteria

Key dose-response criteria include: cancer slope factors (CSFs in $[mg/kg\text{-}day]^{-1}$) for calculating cancer risks from exposure to carcinogens, and reference concentrations (RfCs in $mg/m^3$) and reference doses (RfDs in mg/kg-day) for estimating hazard from exposure to noncarcinogens (see Table 2). In addition, Cal-EPA has developed chronic Reference Exposure Levels for non-cancer effects, which were used in place of RfCs, if available. In this assessment, chronic toxicity criteria were selected (in order of preference) from the following sources:

1) Cal-EPA OEHHA Toxicity Criteria Database, online [2005];
2) USEPA Region IX Preliminary Remedial Goals (PRG) table [2004]

The toxicity criteria and references used in this evaluation are presented in Table 2.

**Utility/Trench Worker Exposures to Soil**

Potential risk to a utility/trench worker was evaluated for the direct contact pathways (incidental ingestion and dermal contact) and inhalation pathways (particulate and vapor). Risks via the direct contact and particulate inhalation pathways were calculated generally using the assumptions and algorithms presented in the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, 2002). For vapor inhalation, the methodology described below was used. It was assumed that a utility/trench worker would be in a trench for 8 hours per day for 20 days of work.

For the utility/trench worker scenario, VOC emissions into a trench and subsequent mixing in air were estimated using the volatilization factor for transport of chemicals from soil to outdoor air from Table X.3.4, of the American Society for Testing and Materials (ASTM) Standard Guide For Provisional Risk-Based Corrective Action (ASTM, 1998). A conservative wind speed of 0.255 meters per second was assumed based on 1/10 of the average wind speed for the Los Angeles area (NCDC, 2004). This speed represents the reduced airflow expected in a trench. Conservative assumptions regarding the size of the trench were also used (assumed area of two side-walls and bottom area of trench was approximately $1.1 \times 10^{+6}$ $cm^2$, length and depth of trench of 9.14 meters and 4.57 meters, respectively). The chemical-specific $VF_{ss,amb}$ for utility/trench worker exposures was derived using the following equation (ASTM, 1998):

$$VF_{ss,amb} = (Pb/DF_{amb}) \times [(4 \times D_{eff} \times H_{eff})/(3.14 \times T \times K_{sw} \times Pb)]^{1/2}$$

Where:

| | | |
|---|---|---|
| $VF_{ss,amb}$ | = | volatilization factor, surficial soils to ambient air (g-soil/$cm^3$-air) |
| $D_{eff}$ | = | effective diffusion coefficient for vadose-zone soils ($cm^2$/s) |
| $DF_{amb}$ | = | dispersion factor for ambient air (cm/s) |
| $H_{eff}$ | = | effective Henry's law coefficient ($cm^3$-water/$cm^3$-air) |
| $K_{sw}$ | = | soil to water partition coefficient ($cm^3$-water/g-soil) |
| Pb | = | dry soil bulk density (g/$cm^3$) |
| T | = | averaging time for surface emission vapor flux (s) |

And where:

$$K_{sw} = \frac{\theta_w + \theta_a\ H_{eff} + Pb\ Kd}{Pb}$$

$$D_{eff} = [((D_{air} \times (\theta_{air}^{3.33} / \theta_T^2)) + ((D_{water} / H_{eff}) \times (\theta_{water}^{3.33} / \theta_T^2))]$$

$$DF_{amb} = \frac{U_{air} \times W \times H}{A}$$

Where:

| | | |
|---|---|---|
| $U_{air}$ | = | ambient air velocity in mixing zone (cm/s) |
| W | = | width of source-zone area (cm) |
| H | = | mixing zone height (cm) |
| A | = | source-zone area ($cm^2$) |

The estimated incremental cancer risk and non-cancer hazard for the utility/trench worker scenario are presented in Table 3.

**Conclusion**

The results of the analysis indicate that potential exposures to a utility/trench worker are at or below levels of significance used by regulatory agencies for occupational exposures. Even when assuming conservative values for exposure frequency and the post remediation soil chemical concentrations the cumulative incremental cancer risk estimate was $3 \times 10^{-6}$ and the cumulative non-cancer hazard index was 1.

TABLE 1

Exposure Parameters

4144 Glencoe Avenue

| Exposure Parameters | Units | UtilityTrench Worker Exposure Scenario | |
|---|---|---|---|
| | | Adult | Source |
| Chemical Concentration in Soil ($C_s$) | mg/kg | -- | -- |
| Chemical Concentration in Air ($C_a$) | $mg/m^3$ | -- | -- |
| Soil Ingestion Rate (IR-S) | mg/day | 330 | USEPA 2002 |
| Skin Surface Area (SA) | $cm^2/day$ | 3,300 | USEPA 2002 |
| Dermal Adsorption Factor (DAF) | unitless | chem-specific | USEPA 2004a |
| Soil Adherence Factor (AF) | $mg/cm^2$ | 0.3 | USEPA 2002 |
| Fraction of Soil Exposed (FE) | unitless | 1.0 | Cal-EPA 1999 |
| Inhalation Rate of Air (IR-A) | $m^3/day$ | 20 | USEPA 1991 |
| Exposure Frequency (EF) | days/year | 20 | Professional judgment |
| Exposure Duration (ED) | years | 1 | Professional judgment |
| Conversion Factor (CF) | kg/mg | 1.0E-06 | -- |
| Body Weight (BW) | kg | 70 | USEPA 1991 |
| Averaging Time for Noncarcinogens ($AT_n$) | days | 365 | USEPA 1989 |
| Averaging Time for Carcinogens ($AT_c$) | days | 25,550 | USEPA 1989 |


References:

" -- " not applicable

Cal-EPA 1999. Preliminary Endangerment Assessment Guidance Manual.

USEPA 1989. Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.

USEPA 1991. RAGS. Vol I: Human Health Evaluation Manual (HHEM) - Supplemental Guidance, Standard Default Exposure Factors. OSWER 9285.6-03.

USEPA 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24

USEPA 2004a. RAGS. Vol I: HHEM - Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance. EPA/540/R-99/005. OSWER 9285.7-02EP.

TABLE 2

Toxicity Criteria

4144 Glencoe Avenue

| Chemical of Potential Concern | DAF [A] | Carcinogenic Toxicity Criteria | | | | | Noncarcinogenic Toxicity Criteria | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oral/Dermal Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$ | Reference | Inhalation Unit Risk Factor $(ug/m^3)^{-1}$ | Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$ | Reference | Oral/Dermal RfD (mg/kg-d) | Reference | Inhalation RfC or REL $(mg/m^3)$ | Inhalation RfD (mg/kg-d) | Reference |
| **PCBs** | | | | | | | | | | | |
| Total PCBs | 0.15 | 5.0E+00 | C | 5.7E-04 | 2.0E+00 | C | 2.0E-05 | A | 7.0E-05 | 2.0E-05 | A,R |
| ***VOCs*** | | | | | | | | | | | |
| Tetrachloroethene | 0.1 | 5.4E-01 | C | 5.9E-06 | 2.1E-02 | C | 1.0E-02 | A | 3.5E-02 | 1.0E-02 | C,REL |
| Trichloroethene | 0.1 | 1.3E-02 | C | 2.0E-06 | 7.0E-03 | C | 3.0E-04 | N,A | 6.0E-01 | 1.7E-01 | C,REL |

Notes:

DAF: dermal absorption factor; RfD: reference dose; RfC: reference concentration

References:

A: USEPA Region 9, Preliminary Remediation Goals (PRGs) Table, October (USEPA 2004b)

C: Cal-EPA (2005) Office of Environmental Health Hazard Assessment (OEHHA), Toxicity Criteria Database http://www.oehha.ca.gov/risk/chemicalDB/index.asp

REL: Cal-EPA OEHHA, Chronic Reference Exposure Levels (RELs) for Airborne Toxicants, http://www.oehha.org/air/chronic_rels/AllChrels.html

N: National Center for Environmental Assessment (NCEA), from Region IX PRG table (USEPA 2004c)

Cancer Toxicity Value Reference Priority:

1. Cal-EPA OEHHA (2005), Toxicity Criteria Database http://www.oehha.ca.gov/risk/chemicalDB/index.asp
2. USEPA Region 9 PRG Table (USEPA 2004b)

Noncancer Toxicity Value Reference Priority:

1. Cal-EPA OEHHA (2005), Chronic RELs for Airborne Toxicants, http://www.oehha.org/air/chronic_rels/AllChrels.html
2. USEPA Region 9 PRG Table (USEPA 2004b)

TABLE 3

Summary of Noncancer Hazard and Cancer Risk

UtilityTrench Worker Exposure Scenario

4144 Glencoe Avenue

| Exposure Pathway | Chemical | Cancer Risk | | | | Noncancer Hazard Quotient | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Shallow Soil Incidental Ingestion, Dermal Contact, and Outdoor Air Inhalation | **Pesticides/PCBs** | | | | | | | | |
| | Total PCBs | 3.1E-07 | 2.5E-12 | 1.4E-07 | 4.5E-07 | 2.2E-01 | 4.3E-06 | 9.9E-02 | 3.2E-01 |
| | **VOCs** | | | | | | | | |
| | Tetrachloroethene | 5.6E-07 | 1.1E-06 | 1.7E-07 | 1.9E-06 | 7.2E-03 | 3.8E-01 | 2.2E-03 | 3.9E-01 |
| | Trichloroethene | 2.0E-08 | 4.3E-07 | 5.9E-09 | 4.5E-07 | 3.5E-01 | 2.5E-02 | 1.1E-01 | 4.8E-01 |
| | (Total) | 8.9E-07 | 1.6E-06 | 3.1E-07 | **3E-06** | 5.8E-01 | 4.0E-01 | 2.1E-01 | **1E+00** |

Note: " -- " not applicable or not available

# ATTACHMENT 1

# SUPPORTING RISK CALCULATIONS

ATTACHMENT TABLE 1.1

RME CALCULATION OF NONCANCER HAZARDS

INGESTION/DERMAL ABSORPTION OF SOIL: UTILITY TRENCH WORKER

4144 Glencoe Avenue

Scenario Timeframe: Future
Exposure Medium: Shallow Soil
Exposure Point: Shallow Soil
Receptor Population: Utility Trench Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Noncancer) | Intake (Noncancer) Units | Oral/Dermal Reference Dose (2) | Oral/Dermal Reference Dose Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | **Pesticides/PCBs** | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 1.7E+01 | mg/kg | M | 4.4E-06 | mg/kg-day | 2.0E-05 | mg/kg-day | 2.2E-01 |
| | **VOCs** | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.8E+02 | mg/kg | M | 7.2E-05 | mg/kg-day | 1.0E-02 | mg/kg-day | 7.2E-03 |
| | Trichloroethene | 4.1E+02 | mg/kg | 4.1E+02 | mg/kg | M | 1.1E-04 | mg/kg-day | 3.0E-04 | mg/kg-day | 3.5E-01 |
| | (Total) | | | | | | | | | | 5.8E-01 |
| Dermal | **Pesticides/PCBs** | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 1.7E+01 | mg/kg | M | 2.0E-06 | mg/kg-day | 2.0E-05 | mg/kg-day | 9.9E-02 |
| | **VOCs** | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.8E+02 | mg/kg | M | 2.2E-05 | mg/kg-day | 1.0E-02 | mg/kg-day | 2.2E-03 |
| | Trichloroethene | 4.1E+02 | mg/kg | 4.1E+02 | mg/kg | M | 3.2E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | 1.1E-01 |
| | (Total) | | | | | | | | | | 2.1E-01 |
| | | | | | | | | | | Total Hazard Index Across All Exposure Routes/Pathways | 7.9E-01 |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic reference dose

ATTACHMENT TABLE 1.2
RME CALCULATION OF NONCANCER HAZARDS
INHALATION OF SOIL VAPORS/PARTICULATES: UTILITY TRENCH WORKER
4144 Glencoe Avenue

Scenario Timeframe: Future
Exposure Medium: Ambient Air
Exposure Point: Shallow soil vapors/particulates
Receptor Population: Utility Trench Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Noncancer) | Intake (Noncancer) Units | Inhalation Reference Dose (2) | Inhalation Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inhalation | **Pesticides/PCBs** | | | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 5.5E-09 | mg/m$^3$ | R | 8.7E-11 | mg/kg-day | 2.0E-05 | mg/kg-day | 7.0E-05 | mg/m3 | 4.3E-06 |
| | **VOCs** | | | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.4E-01 | mg/m$^3$ | R | 3.8E-03 | mg/kg-day | 1.0E-02 | mg/kg-day | 3.5E-02 | mg/m3 | 3.8E-01 |
| | Trichloroethene | 4.1E+02 | mg/kg | 2.7E-01 | mg/m$^3$ | R | 4.3E-03 | mg/kg-day | 1.7E-01 | mg/kg-day | 6.0E-01 | mg/m3 | 2.5E-02 |
| | | | | | | | | | | | | Total Hazard Index Across All Exposure Routes/Pathways | 4.0E-01 |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic reference dose

ATTACHMENT TABLE 1.3

RME CALCULATION OF CANCER RISKS

INGESTION/DERMAL ABSORPTION OF SOIL: UTILITY TRENCH WORKER

4144 Glencoe Avenue

| |
|---|
| Scenario Timeframe: Future |
| Exposure Medium: Shallow Soil |
| Exposure Point: Shallow Soil |
| Receptor Population: Utility Trench Worker |
| Receptor Age: Adult |

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Oral/Dermal Cancer Slope Factor | Oral/Dermal Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | **Pesticides/PCBs** | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 1.7E+01 | mg/kg | M | 6.3E-08 | mg/kg-day | 5.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-07 |
| | **VOCs** | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.8E+02 | mg/kg | M | 1.0E-06 | mg/kg-day | 5.4E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-07 |
| | Trichloroethene | 4.1E+02 | mg/kg | 4.1E+02 | mg/kg | M | 1.5E-06 | mg/kg-day | 1.3E-02 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | (Total) | | | | | | | | | | 8.9E-07 |
| Dermal | **Pesticides/PCBs** | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 1.7E+01 | mg/kg | M | 2.8E-08 | mg/kg-day | 5.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-07 |
| | **VOCs** | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.8E+02 | mg/kg | M | 3.1E-07 | mg/kg-day | 5.4E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-07 |
| | Trichloroethene | 4.1E+02 | mg/kg | 4.1E+02 | mg/kg | M | 4.5E-07 | mg/kg-day | 1.3E-02 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-09 |
| | (Total) | | | | | | | | | | 3.1E-07 |
| | | | | | | | | | | Total Risk Across All Exposure Routes/Pathways | 1.2E-06 |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

ATTACHMENT TABLE 1.4

RME CALCULATION OF CANCER RISKS

INHALATION OF SOIL VAPORS/PARTICULATES: UTILITY TRENCH WORKER

4144 Glencoe Avenue

Scenario Timeframe: Future
Exposure Medium: Ambient Air
Exposure Point: Shallow soil vapors/particulates
Receptor Population: Utility Trench Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Inhalation Cancer Slope Factor | Inhalation Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Inhalation | **Pesticides/PCBs** | | | | | | | | | | |
| | Total PCBs | 1.7E+01 | mg/kg | 5.5E-09 | $mg/m^3$ | R | 1.2E-12 | mg/kg-day | 2.0E+00 | $mg/kg\text{-}day^{-1}$ | 2.5E-12 |
| | **VOCs** | | | | | | | | | | |
| | Tetrachloroethene | 2.8E+02 | mg/kg | 2.4E-01 | $mg/m^3$ | R | 5.4E-05 | mg/kg-day | 2.1E-02 | $mg/kg\text{-}day^{-1}$ | 1.1E-06 |
| | Trichloroethene | 4.1E+02 | mg/kg | 2.7E-01 | $mg/m^3$ | R | 6.1E-05 | mg/kg-day | 7.0E-03 | $mg/kg\text{-}day^{-1}$ | 4.3E-07 |
| | | | | | | | | | | Total Risk Across All Exposure Routes/Pathways | 1.6E-06 |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

ATTACHMENT TABLE 1.5

Summary of Noncancer Hazard and Cancer Risk

Utility Trench Worker Exposure Scenario

4144 Glencoe Avenue

| Exposure Pathway | Chemical | Cancer Risk | | | | Noncancer Hazard Quotient | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Shallow Soil Incidental Ingestion, Dermal Contact, and Outdoor Air Inhalation | **Pesticides/PCBs** | | | | | | | | |
| | Total PCBs | 3.1E-07 | 2.5E-12 | 1.4E-07 | 4.5E-07 | 2.2E-01 | 4.3E-06 | 9.9E-02 | 3.2E-01 |
| | **VOCs** | | | | | | | | |
| | Tetrachloroethene | 5.6E-07 | 1.1E-06 | 1.7E-07 | 1.9E-06 | 7.2E-03 | 3.8E-01 | 2.2E-03 | 3.9E-01 |
| | Trichloroethene | 2.0E-08 | 4.3E-07 | 5.9E-09 | 4.5E-07 | 3.5E-01 | 2.5E-02 | 1.1E-01 | 4.8E-01 |
| | (Total) | 8.9E-07 | 1.6E-06 | 3.1E-07 | **3E-06** | 5.8E-01 | 4.0E-01 | 2.1E-01 | **1E+00** |

Note: " -- " not applicable or not available

# EXHIBIT 2

# RISK-BASED CONCENTRATION CALCULATIONS FOR THE VAPOR INTRUSION PATHWAY

# EXHIBIT 2

## RISK BASED CONCENTRATION CALCULATIONS FOR THE VAPOR INTRUSION PATHWAY

The following calculations have been prepared to summarize the development of risk based concentrations (RBC) for the vapor intrusion pathway for the 4144 Glencoe Avenue Site. These calculations conform to the USEPA and DTSC Johnson and Ettinger Model spreadsheets (USEPA, 2003, Johnson and Ettinger 1991) upgraded to evaluate the effect of passive sub-surface vapor barriers on contaminant vapor intrusion and calculate RBCs. Appropriate information supporting the calculations in this exhibit is included as Attachment 1. Three scenarios are considered and spreadsheets to perform these calculations have been submitted to DTSC for review:

1. <u>Mixed Use Building – Commercial Receptor</u>: This scenario considers the RBCs for the commercial occupant on the ground floor of a mixed use building. These calculations assume that the ground floor is commercial and the 2$^{nd}$ floor is residential. The exposure assumptions for the commercial receptor include an exposure frequency of 12 hours a day for 250 days per year. The exposure duration for the commercial receptor is assumed to be 25 years. A target risk of 1 x $10^{-5}$ is assumed for the commercial receptor.

2. <u>Mixed Use Building – Residential Receptor</u>: This scenario considers the RBCs for the residential occupant on the second floor of a mixed use building. These calculations assume that the ground floor is commercial and the 2$^{nd}$ floor is residential. The exposure assumptions for the residential receptor include an exposure frequency of 24 hours a day for 350 days per year. The exposure duration for the residential receptor is assumed to be 30 years. A target risk of 1 x $10^{-6}$ is assumed for the residential receptor.

3. <u>Ground Floor or Subterranean Garage with Residential_Receptor</u>: This scenario considers the RBCs for the residential occupant living on the second floor with a ground-level podium garage or the occupant living on the first floor above a subterranean garage. The exposure assumptions for the residential receptor include an exposure frequency of 24 hours a day for 350 days per year. The exposure duration for the residential receptor is assumed to be 30 years. A target risk of 1 x $10^{-6}$ is assumed for the residential receptor.

Model Inputs for the Sub-Slab Vapor Barrier

The additional attenuation provided by a sub-slab vapor barrier is evaluated by adjusting the thickness of Stratum B in the spreadsheets utilized for these calculations. The model used in this evaluation assumes the VOC flux across the floor and subterranean walls of the structure are equal. Therefore, simulations examining the effect of a sub-slab vapor barrier for the subterranean garage scenario assume the vapor control is present outside the walls as well as beneath the floor of the garage. For slab-on grade construction, the sub-slab vapor barrier is simply assumed to be present beneath the foundation. A thickness of 0.10 cm is input for a 40 mil liner[1] and a thickness of 0 is used to simulate the "No Controls" case.

The diffusion across the liner has been calculated to account for the low diffusivity of the liner and conservatively considers possible defects in the liner. To account for possible defects in the liner, the effective diffusion across the liner, $D_{liner}^{eff}$, is calculated by:

$$D_{liner}^{eff} = D_{air}\eta_{liner} + D_{liner}(1-\eta_{liner}) \qquad (1)$$

where:

$D_{air}$ is the diffusion coefficient for the VOC in air ($cm^2/s$);
$\eta_{liner}$ is the liner defect area ratio, ($cm^2$ defects/$cm^2$ liner); and
$D_{liner}$ is the diffusion coefficient for VOCs through the liner material ($cm^2/s$).

The first term in this expression accounts for the diffusion across the liner defects and the second term represents the diffusion across the liner (with no defects).

A literature review has been conducted to select a conservative representative value for the diffusion coefficient of VOCs through the liner material. References examined in this evaluation are provided below. Reported diffusion coefficients for polyethylene geomembranes, $D_{liner}$, range from $2.9 \times 10^{-9}$ to $7.9 \times 10^{-9}$ $cm^2/s$. A conservative diffusion coefficient of $1 \times 10^{-8}$ $cm^2/s$ was used for the RBC calculation[2].

---

[1] A 40 mil liner is 0.040 inches thick = 0.102 cm

[2] Therefore, the value of $1\text{x}10^{-8}$ adopted for the liner diffusion coefficient is over 25% more conservative than the value found in the literature cited below.

A literature review was conducted to determine a conservative value for the liner defect area ratio. The literature provides a conservative estimate for the liner defect area ratio of 1 $cm^2$ per acre of liner (1 acre is approximately 4000 $m^2$). As a further level of conservatism, the literature estimate was increased by a factor of 4, to a liner defect area ratio of 4 $cm^2$ per acre (4 $cm^2$/4000 $m^2$) = $1 \times 10^{-7}$, for the RBC calculations.

Modeling Air Exchange between Ground Floor and Second Floor Units

The Johnson & Ettinger model is used to calculate the attenuation factor for soil gas to bottom floor indoor air. An attenuation factor for vapor migration between the first floor and the second floor (or subterranean garage and first floor residence) is then used to calculate an overall attenuation factor for residents. A leakage factor for indoor air flow between floors was established based on published studies of air flow distribution in multifamily buildings. Measured air leakage between residential units on the lower floors ranged from less than 4% to approximately 2%. These studies were conducted on buildings in colder climates (Minnesota and Massachusetts) where stack effects are likely to be more significant than in California. An average air leakage value of 3% is used in the RBC calculations. Consequently, the VOC concentration in 2nd floor units is estimated to be 33 times lower than the concentration in the ground floor structure. This attenuation value is considered to be conservative (i.e., a higher reduction is expected) given the building ventilation code requirements for new construction in California[3].

Other Model Inputs

A list of the model inputs used for the vapor intrusion RBC calculations is provided in Table 1. Different inputs are utilized for the mixed use and garage scenarios for the enclosed space height (podium garage = 8 feet, subterranean garage = 12 feet, mixed use = 10 feet) and air exchange rate (garage = 11.5 air exchanges per hour, mixed use = 1 air exchange per hour). The depth of the foundation is assumed to be 0.5 feet below ground surface for the slab-on grade scenarios and 12 feet below ground surface for the subterranean garage scenario. When examining the effect of the sub-slab vapor barrier, the liner thickness varies from 0 cm (“No Controls”) to 0.1 cm (“with Controls” considering a 40 mil liner).

---

[3] 2001 California Building Code (24 CCR Part 2, vol. 1), 2001 California Mechanical Code (24 CCR Part 4), and ANSI/ASHRAE Standard 62.2-2004 - Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings.

Model Results

The RBC model calculation results are summarized in Table 2 and Figure 1. For the mixed use scenarios (commercial first floor/residential upper floors), both the calculated RBCs for the ground floor commercial and 2nd floor residential are provided. However, since the RBC based on the residential receptor is slightly lower than the RBC for the commercial receptor, the residential RBC is the limiting RBC.

The RBC model calculations are also used to assess the calculated effectiveness of the passive subsurface vapor barrier. The calculated RBCs for the commercial/residential scenarios including a subsurface vapor barrier with a 40 mil liner are approximately 100 times greater than the No Controls cases. This is equivalent to a 99% effectiveness for this barrier. The calculated RBCs for the garage scenarios, including a subsurface vapor barrier with a 40 mil liner, are approximately 40 - 50 times greater than the No Controls case. This is equivalent to a 97 - 98% effectiveness for this barrier.

Evaluation of Post-Remedy Soil Vapor Concentrations

The results of the post-remediation soil vapor survey will be used to evaluate post-remediation risks from residual TCE and PCE soil vapor concentrations using a post-remediation risk assessment. Land use zoning for this area permits a building size on the site of approximately 27,000 square feet.[4] Therefore, to accurately evaluate residual soil vapor risks, an average of all of the data that may be present beneath the building must be considered. This is because soil vapor flux into the building and resulting indoor air concentrations are not dependent on the soil vapor concentration at a single point and single point of entry, but rather the average flux that is distributed across the entire foundation. To calculate an average soil vapor concentration two methods are proposed: the 95 Upper Confidence Limit Concentration (95UCL) and an area-weighted average. These average soil vapor concentrations will then be compared to the RBCs discussed above.

Uncertainties

[4] While zoning regulations would permit a larger footprint, a smaller footprint has been conservatively estimated. Actual development plans, if available, will be considered at the time of the post-remediation survey.

The results presented in this RBC analysis are based on site-specific parameter inputs which characterize the commercial exposures, building characteristics, liner properties, and subsurface properties.

- The commercial exposures are based on a 12-hour work day, for 250 days per year.

- Three building construction scenarios have been evaluated: (1) mixed use with commercial on the ground floor and residential on the second floor, (2) residential occupancy on the second floor with a ground-level podium garage, and (3) residential occupancy on the first floor above a subterranean garage.

- The effective diffusivity of the liner has been calculated using measured values published in the literature for diffusion coefficients of VOCs through a HDPE liner and the potential for construction defects (tears, holes, or openings) in the liner. Proper quality control during liner installation is necessary to be consistent with the assumed liner properties used in the RBC calculations.

- The RBC calculations presented here are based on the geotechnical properties for the subsurface silty soils. Soil vapor samples are assumed to be collected 10 feet below ground surface for the slab on grade scenarios and immediately beneath the slab for the subterranean garage scenario.

Modification of these parameters may increase or decrease the calculated RBCs.

Additionally, uncertainties that are common to all risk assessment calculations (e.g., toxicity values, exposure assumptions, source concentration assumptions) are also applicable to this evaluation.

References:

*Vapor Intrusion References:*

Johnson, P.C., and Ettinger, R.A. 1991. Heuristic Model for Predicting the Intrusion of Contaminant Vapors into Buildings. Environmental Science and Technology, v.25(8) 1445-1452.

USEPA, 2003. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response. June 19, 2003.

DTSC, 2005 Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. Interim Final. Revised February 2005.

*Liner Properties:*

Landfilldesign.com, Leakage Rate Through Geomembrane Liner – Design Calculator http://www.landfilldesign.com/cgi-bin/geomembrane_leakage.pl

Edil, T.B., Quantification of Diffusion Across Composite Liners. Intercontinental Landfill Research Symposium, 2002

Foose, G.J., Benson, C.H., Edil, T.B., Comparison of Solute Transport in Three Composite Liners. Journal of Geotechnical and Geoenvironmental Engineering, 391-403. May 2002.

Edil, T.B., 2003. A review of Aqueous-Phase VOC Transport in Modern Landfill Liners. Waste Management, 23 561-571.

Foose, G.J., Benson, C.H., Edil, T.B, Equivalency of Composite Geosynthetic Clay Liners as a Barrier to Volatile Organic Compounds. http://www.uwgeotech.org/Old%20Website%20Files/pubs/wl_foose_equivalency.pdf

*Air Flow Distribution:*

Feustel HE and Diamond RC, 1996. Diagnostics and measurements of infiltration and ventilation systems in high-rise apartment buildings. Published in the Proceedings of the 1996 Summer Study on Energy Efficiency in Buildings, American Council for an Energy Efficient Economy, Washington DC, August, 1996.http://epb.lbl.gov/homepages/Rick_Diamond/Highrise_aceee_96.pdf

Center for Energy and Environment, 2004. Reduction of Environmental Tobacco Smoke Transfer in Minnesota Multifamily Buildings Using Air Sealing and Ventilation Treatments. http://www.mncee.org/ceedocs/mpaat/summary.pdf

* * * * *

## Table 1
## CDE Risk Based Concentration Modeling Input Parameters

| Model Input Parameter | Value Used | Rationale |
|---|---|---|
| **Soil Properties** | | |
| Average Soil / Groundwater Temperature (Ts), °C | 19 | Based on typical groundwater concentration for Southern CA (DTSC, 2005) |
| Soil gas sampling depth below grade (Ls), cm | 305 | 10 ft depth |
| Thickness of soil stratum A ($h_A$), cm | 305 | Depth-to-SG sample |
| Thickness of soil stratum B ($h_B$), cm | 0 or 0.10 | Stratum B used to simulate vapor barrier liner. No liner or 40 mil liner |
| Thickness of soil stratum C ($h_C$), cm | -- | Not applicable |
| Soil stratum A SCS soil type | SI | silty soil type |
| Stratum A soil dry bulk density, gm/cm$^3$ | 1.35 | J&E model default assumption for SI soil type |
| Stratum A soil total porosity, unitless | 0.489 | J&E model default assumption for SI soil type |
| Stratum A soil water-filled porosity, cm$^3$/cm$^3$ | 0.167 | J&E model default assumption for SI soil type |
| Liner effective diffusivity ($D_{liner}^{eff}$), cm$^2$/s | Calculated | $D_{liner}^{eff} = D_{air}\eta_{liner} + D_{liner}(1-\eta_{liner})$ |
| VOC diffusivity across liner ($D_{liner}$), cm$^2$/s | 1.00E-08 | Conservative value from literature review. See attached reference list |
| Liner defect area ratio ($\eta_{liner}$), cm$^2$ defects/cm$^2$ liner | 1.00E-07 | Conservative value from literature review. 4 cm$^2$ defects per acre |
| **Commercial / Residential Building Parameters** | | Assumes ground floor commercial with second floor residential |
| Depth below grade to bottom of enclosed space floor ($L_F$), cm | 15 | Slab construction |
| Enclosed space floor thickness ($L_{crack}$), cm | 10 | Default assumption |
| Enclosed space floor length ($L_B$), cm | 1000 | Default building dimension |
| Enclosed space floor width ($W_B$), cm | 1000 | Default building dimension |
| Enclosed space height ($H_B$), cm | 305 | Assumed ceiling height, 10 feet |
| Building crack fraction ($\eta$), unitless | 0.0004 | Calculated assuming 0.1 cm perimeter crack |
| Indoor air exchange rate (ER), hour$^{-1}$ | 1 | DTSC, 2005 |
| Average vapor flow rate into building (Qsoil), L/m | 5 or 1 | Typical rates range from 1 - 10 L/min. 5 L/min assumed for no control scenario, 1 L/min assumed for cases with controls |
| **Podium Garage Building Parameters** | | Assumes ground floor garage with second floor residential |
| Depth below grade to bottom of enclosed space floor ($L_F$), cm | 15 | Slab construction |
| Enclosed space floor thickness ($L_{crack}$), cm | 10 | Default assumption |
| Enclosed space floor length ($L_B$), cm | 1000 | Default building dimension |
| Enclosed space floor width ($W_B$), cm | 1000 | Default building dimension |
| Enclosed space height ($H_B$), cm | 244 | Assumed ceiling height, 10 feet |
| Building crack fraction ($\eta$), unitless | 0.0004 | Calculated assuming 0.1 cm perimeter crack |
| Indoor air exchange rate (ER), hour$^{-1}$ | 11.5 | California Building Code: garage ventilation rate = 1.5 CFM/SF |
| Average vapor flow rate into building (Qsoil), L/m | 1 | Typical rates range from 1 - 10 L/min. 1 L/min assumed for garage. |
| **Subterranean Garage Building Parameters** | | Assumes ground floor garage with second floor residential |
| Depth below grade to bottom of enclosed space floor ($L_F$), cm | 366 | Subterranean garage 12 feet below ground surface |
| Enclosed space floor thickness ($L_{crack}$), cm | 10 | Default assumption |
| Enclosed space floor length ($L_B$), cm | 1000 | Default building dimension |
| Enclosed space floor width ($W_B$), cm | 1000 | Default building dimension |
| Enclosed space height ($H_B$), cm | 366 | Assumed ceiling height, 12 feet |
| Building crack fraction ($\eta$), unitless | 0.0004 | Calculated assuming 0.1 cm perimeter crack |
| Indoor air exchange rate (ER), hour$^{-1}$ | 11.5 | California Building Code: garage ventilation rate = 1.5 CFM/SF |
| Average vapor flow rate into building (Qsoil), L/m | 1 | Typical rates range from 1 - 10 L/min. 1 L/min assumed for garage. |

| Parameter | Commercial | Residential |
|---|---|---|
| Exposure Duration (yr), ED | 25 | 30 |
| Exposure Frequency (days/yr), EF | 125 | 350 |
| Averaging Time, Non-carcinogen (yr), ATNC | 25 | 30 |
| Averaging Time, Carcinogen (yr), ATC | 70 | 70 |
| Target Risk | 1.00E-05 | 1.00E-06 |
| Target Hazard | 1 | 1 |

Note:

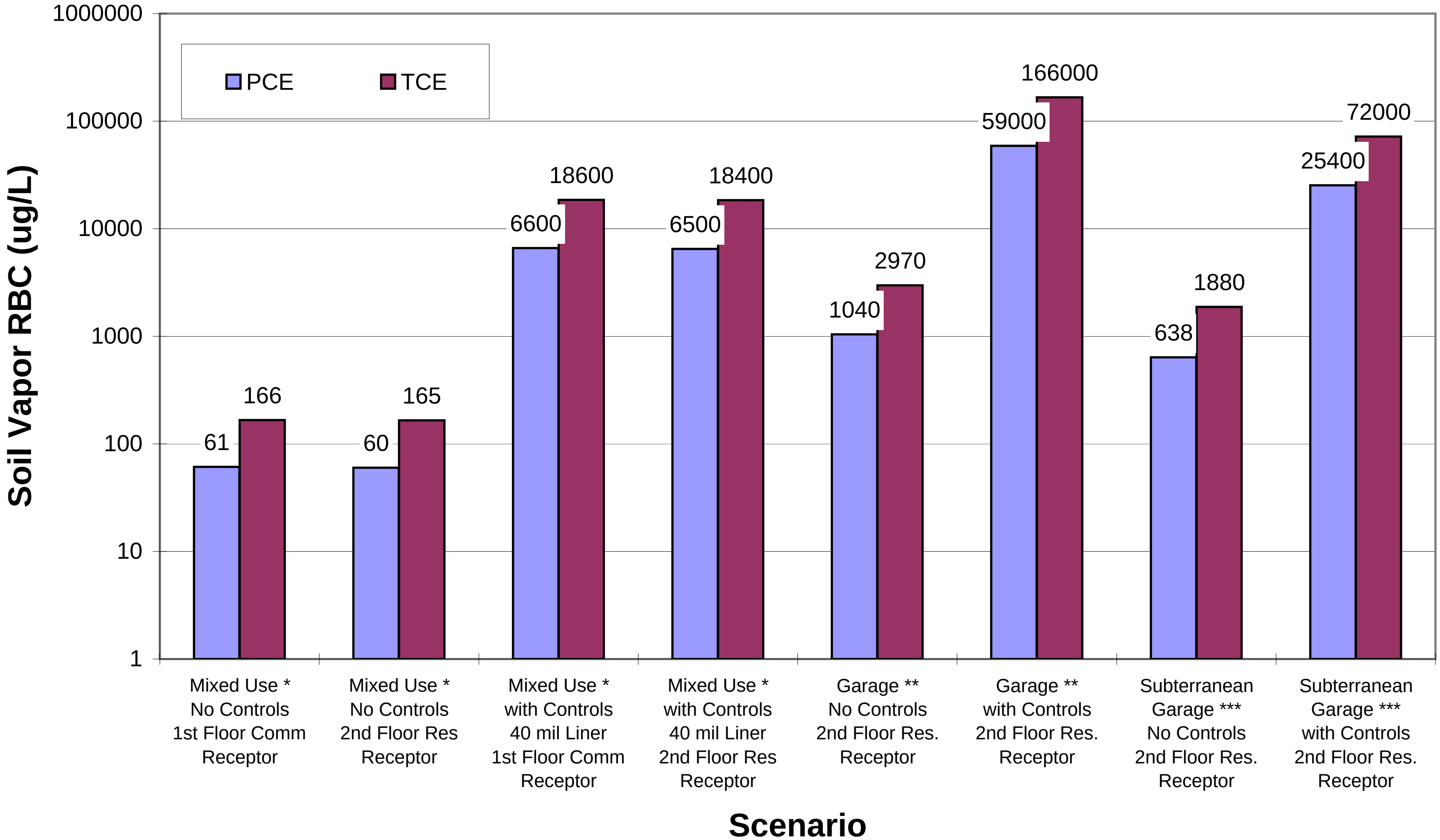
Commercial scenario EF equivalent to 250 days per year and 12 hours/day

Table 2
RBC Calculations Summary

| | Mixed Use * No Controls 1st Floor Comm Receptor | Mixed Use * No Controls 2nd Floor Res Receptor | Mixed Use * with Controls 40 mil Liner 1st Floor Comm Receptor | Mixed Use * with Controls 40 mil Liner 2nd Floor Res Receptor | Garage ** No Controls 2nd Floor Res. Receptor | Garage ** with Controls 2nd Floor Res. Receptor | Subterranean Garage *** No Controls 2nd Floor Res. Receptor | Subterranean Garage *** with Controls 2nd Floor Res. Receptor |
|---|---|---|---|---|---|---|---|---|
| Inputs: | | | | | | | | |
| Foundation Depth (cm) | 15 | 15 | 15 | 15 | 15 | 15 | 366 | 366 |
| Sample depth (cm) | 305 | 305 | 305 | 305 | 305 | 305 | 381 | 381 |
| Qsoil (L/min) | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 1 |
| HB (cm) | 305 | 305 | 305 | 305 | 244 | 244 | 366 | 366 |
| ER (1/hr) | 1 | 1 | 1 | 1 | 11.25 | 11.25 | 11.25 | 11.25 |
| $\eta$ | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 |
| Membrane Thickness | 0.00 | 0.00 | 0.10 | 0.10 | 0.00 | 0.10 | 0.00 | 0.10 |
| Average $\alpha$ | 2.37E-04 | 2.37E-04 | 2.16E-06 | 2.16E-06 | 1.34E-05 | 2.40E-07 | 2.16E-05 | 5.53E-07 |
| Target Risk | 1.00E-05 | 1.00E-06 | 1.00E-05 | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 |
| Receptor | Commercial | Residential | Commercial | Residential | Residential | Residential | Residential | Residential |
| D_liner | 1.0E-08 | 1.0E-08 | 1.0E-08 | 1.0E-08 | 1.0E-08 | 1.0E-08 | 1.0E-08 | 1.0E-08 |
| $\eta$ liner | 1.0E-07 | 1.0E-07 | 1.0E-07 | 1.0E-07 | 1.0E-07 | 1.0E-07 | 1.0E-07 | 1.0E-07 |
| Leakage Factor | NA | 3% | NA | 3% | 3% | 3% | 3% | 3% |
| RBCs (ug/L) | | | | | | | | |
| PCE | 61 | 60 | 6600 | 6500 | 1040 | 59000 | 638 | 25400 |
| TCE | 166 | 165 | 18600 | 18400 | 2970 | 166000 | 1880 | 72000 |

* Mixed Use = Ground floor commercial and 2nd floor (and above) residential
* * Garage = Open Air Podium Parking No first floor receptor is assumed
*** Subterranean Garage = Garage extending 12 ft below ground surface. Residents assumed at ground floor above garage.

## Figure 1
## Risk Based Concentrations




*    Mixed Use = Ground floor commercial and 2nd floor (and above) residential
* *  Garage = Open Air Podium Parking   No first floor receptor is assumed
Assumed sample depth for RBC = 10 ft bgs
Analysis assumes engineered controls outside walls and beneath floor of subterranean garage.

*** Subterranean Garage = Garage extending 12 ft below ground surface.
Residents assumed at ground floor above garage.
Assumed sample depth for RBC = 12.5 ft bgs

**EXHIBIT 2**

**ATTACHMENT 1**

**RBC SUPPORTING CALCULATIONS**

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ (μg/m$^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ (cm$^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 305 | 19 | 305 | 0 | | SI | | |
| | 10 | ft bgs | | | | | | |

Totals must add up to value of Ls (cell F24)

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ (g/cm$^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ (cm$^3$/cm$^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ (g/cm$^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ (cm$^3$/cm$^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ (g/cm$^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ (cm$^3$/cm$^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |

Lookup Soil Parameters | Lookup Soil Parameters | Lookup Soil Parameters

| Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio |
|---|---|---|
| | 1.00E-08 | 1.00E-07 |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ (g/cm-s$^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 305 | 0.1 | 1 | 5 |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 25 | 25 | 125 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

**Attachment 1A**
**Mixed Use Building**
**Commercial Receptor Scenario**
**No Controls**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | CAS No. not found |
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Tetrachloroethylene |
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | 0.00E+00 | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 6.92E-03 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 7.59E-03 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | 6.92E-03 | 4.0E+02 | 6.53E+130 | 2.29E-04 | 2.29E-04 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | 7.59E-03 | 4.0E+02 | 1.67E+119 | 2.46E-04 | 2.46E-04 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

| | | |
|---|---|---|
| **Inputs:** | | |
| Qsoil (L/min) | 5 | |
| HB (cm) | 305 | |
| ER (1/hr) | 1 | |
| Sample depth (cm) | 305 | |
| η | 0.0004 | - |
| Membrane Thickness | 0.00 | cm |
| Average α | 0.00E+00 | - |
| Target Risk | 1.00E-05 | - |
| Receptor | Commercial | |
| D_liner | 1.0E-08 | cm2/s |
| η liner | 1.0E-07 | - |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-05 ug/m3 | RBCs Target Risk 1.00E-05 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 1.7E-10 | 2.2E-06 | Tetrachloroethylene | 6.05E+04 | 61 | 4.46E+05 | 446 |
| 6.0E-11 | 1.4E-07 | Trichloroethylene | 1.66E+05 | 166 | 7.13E+06 | 7,132 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

RBC = (Target Risk) / (Risk based on unit source concentration)
or
RBC = (Target HQ / (HQ based on unit source concentration)

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical | |
|---|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found | Previous liner Deff calculation approach - no longer used |
| 127184 | 1 | | | | Tetrachloroethylene | |
| 79016 | 1 | | | | Trichloroethylene | |

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 305 | 19 | 305 | 0 | | SI | | |
| | 10 | ft bgs | | | | | | |

Totals must add up to value of Ls (cell F24)

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lookup Soil Parameters | | | | Lookup Soil Parameters | | | | Lookup Soil Parameters | | | |
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |
| | | | | | Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio | | | | |
| | | | | | | 1.00E-08 | 1.00E-07 | | | | |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 305 | 0.1 | 1 | 5 |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2$/s) | Diffusivity in water, $D_w$ ($cm^2$/s) | Henry's law constant at reference temperature, H (atm-$m^3$/mol) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($\mu g/m^3)^{-1}$ | Reference conc., RfC (mg/$m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | CAS No. not found |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Tetrachloroethylene |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ ($atm\text{-}m^3/mol$) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | 0.00E+00 | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 6.92E-03 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 7.59E-03 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | 6.92E-03 | 4.0E+02 | 6.53E+130 | 2.29E-04 | 2.29E-04 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 8.33E+01 | 7.59E-03 | 4.0E+02 | 1.67E+119 | 2.46E-04 | 2.46E-04 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 5 | |
| HB (cm) | 305 | |
| ER (1/hr) | 1 | |
| Sample depth (cm) | 305 | |
| $\eta$ | 0.0004 | - |
| Membrane Thickness | 0.00 | cm |
| Average $\alpha$ | 0.00E+00 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| $\eta$ liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 5.6E-10 | 6.3E-06 | Tetrachloroethylene | 6.00E+04 | 60 | 5.31E+06 | 5,314 |
| 2.0E-10 | 3.9E-07 | Trichloroethylene | 1.65E+05 | 165 | 8.49E+07 | 84,907 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | | OR | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 305 | 19 | 304.9 | 0.1 | | SI | | |
| | 10 | ft bgs | | | | | | |

Totals must add up to value of Ls (cell F24)

| ENTER Stratum A SCS soil type (Lookup Soil Parameters) | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type (Lookup Soil Parameters) | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type (Lookup Soil Parameters) | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |

| Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio |
|---|---|---|
| | 1.00E-08 | 1.00E-07 |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 305 | 0.1 | 1 | 1 |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 25 | 25 | 125 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | CAS No. not found |
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Tetrachloroethylene |
| 7.88E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | #N/A | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 4.95E-05 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 5.16E-05 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 2.11E-06 | 2.11E-06 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 2.20E-06 | 2.20E-06 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**Attachment 1C**
**Mixed Use Building**
**Commercial Receptor Scenario**
**With Controls**

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 305 | |
| ER (1/hr) | 1 | |
| Sample depth (cm) | 305 | |
| η | 0.0004 | - |
| Membrane Thickness | 0.10 | cm |
| Average α | 0.00E+00 | - |
| Target Risk | 1.00E-05 | - |
| Receptor | Commercial | |
| D_liner | 1.0E-08 | cm2/s |
| η liner | 1.0E-07 | - |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-05 ug/m3 | mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 1.5E-12 | 2.1E-08 | Tetrachloroethylene | 6.56E+06 | 6556 | 4.84E+07 | 48,353 |
| 5.4E-13 | 1.3E-09 | Trichloroethylene | 1.86E+07 | 18586 | 7.97E+08 | 796,554 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

RBC = (Target Risk) / (Risk based on unit source concentration)
or
RBC = (Target HQ / (HQ based on unit source concentration)

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

Totals must add up to value of Ls (cell F24)

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 305 | 19 | 304.9 | 0.1 | | SI | | |
| | 10 | ft bgs | | | | | | |

| ENTER Stratum A SCS soil type (Lookup Soil Parameters) | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type (Lookup Soil Parameters) | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type (Lookup Soil Parameters) | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |
| | | | | | Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio | | | | |
| | | | | | | 1.00E-08 | 1.00E-07 | | | | |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 305 | 0.1 | 1 | | 1 |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | CAS No. not found |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Tetrachloroethylene |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 8.47E+04 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | #N/A | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 4.95E-05 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 5.16E-05 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF ($\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 2.11E-06 | 2.11E-06 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 2.20E-06 | 2.20E-06 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 305 | |
| ER (1/hr) | 1 | |
| Sample depth (cm) | 305 | |
| $\eta$ | 0.0004 | - |
| Membrane Thickness | 0.10 | cm |
| Average $\alpha$ | 0.00E+00 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| $\eta$ liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 5.1E-12 | 5.8E-08 | Tetrachloroethylene | 6.50E+06 | 6504 | 5.76E+08 | 575,633 |
| 1.8E-12 | 3.5E-09 | Trichloroethylene | 1.84E+07 | 18439 | 9.48E+09 | 9,482,783 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ ($^oC$) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| | | | Totals must add up to value of Ls (cell F24) | | | | | |
| 15 | 305 | 19 | 305 | 0 | | SI | | |
| | 10 | ft bgs | | | | | | |

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lookup Soil Parameters | | | | Lookup Soil Parameters | | | | Lookup Soil Parameters | | | |
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |

| Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio |
|---|---|---|
| | 1.00E-08 | 1.00E-07 |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 11.25 | | 1 |
| | | | | 8 | | | | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

**Attachment 1E**
**Podium Garage**
**Residential Receptor Scenario**
**No Controls**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | CAS No. not found |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Tetrachloroethylene |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ ($atm\text{-}m^3/mol$) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | 0.00E+00 | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 6.92E-03 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 7.59E-03 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 1.32E-05 | 1.32E-05 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 1.37E-05 | 1.37E-05 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 244 | |
| ER (1/hr) | 11.25 | |
| Sample depth (cm) | 305 | |
| η | 0.0004 | - |
| Membrane Thickness | 0.00 | cm |
| Average α | 1.34E-05 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| η liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 3.2E-11 | 3.6E-07 | Tetrachloroethylene | 1.04E+06 | 1044 | 9.24E+07 | 92,358 |
| 1.1E-11 | 2.2E-08 | Trichloroethylene | 2.97E+06 | 2970 | 1.53E+09 | 1,527,538 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical | |
|---|---|---|---|---|---|
| | 1 | | | CAS No. not found | Previous liner Deff calculation approach - no longer used |
| 127184 | 1 | | | Tetrachloroethylene | |
| 79016 | 1 | | | Trichloroethylene | |

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 305 | 19 | 304.9 | 0.1 | | SI | | |
| | 10 | ft bgs | | | | | | |

Totals must add up to value of Ls (cell F24)

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lookup Soil Parameters | | | | Lookup Soil Parameters | | | | Lookup Soil Parameters | | | |
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |
| | | | | | Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio | | | | |
| | | | | | | 1.00E-08 | 1.00E-07 | | | | |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 11.25 | 1 |
| | | | | 8 | | | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | CAS No. not found |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Tetrachloroethylene |
| 9.46E+08 | 290 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ ($atm\text{-}m^3/mol$) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | #N/A | 0.00E+00 | #N/A | 290 | CAS No. not found |
| 1.06E+06 | 3.77E-04 | 15 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 4.95E-05 | 290 | Tetrachloroethylene |
| 1.06E+06 | 3.77E-04 | 15 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 5.16E-05 | 290 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, 0.1 (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 2.35E-07 | 2.35E-07 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 15 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 2.44E-07 | 2.44E-07 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 244 | |
| ER (1/hr) | 11.25 | |
| Sample depth (cm) | 305 | |
| η | 0.0004 | - |
| Membrane Thickness | 0.10 | cm |
| Average α | 2.40E-07 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| η liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 5.7E-13 | 6.4E-09 | Tetrachloroethylene | 5.85E+07 | 58539 | 5.18E+09 | 5,180,698 |
| 2.0E-13 | 3.9E-10 | Trichloroethylene | 1.66E+08 | 165949 | 8.53E+10 | 85,345,046 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

0

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

Totals must add up to value of Ls (cell F24)

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 366 | 381 | 19 | 381.25 | 0 | | SI | | |
| | 12.5 | ft bgs | | | | | | |

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lookup Soil Parameters | | | | Lookup Soil Parameters | | | | Lookup Soil Parameters | | | |
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |

| Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio |
|---|---|---|
| | 1.00E-08 | 1.00E-07 |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 11.25 | | 1 |
| | | | | 8 | | | | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | CAS No. not found |
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Tetrachloroethylene |
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.46E+06 | 1.62E-04 | 366 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | 0.00E+00 | 0.00E+00 | #N/A | 15.25 | CAS No. not found |
| 2.46E+06 | 1.62E-04 | 366 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 6.92E-03 | 15.25 | Tetrachloroethylene |
| 2.46E+06 | 1.62E-04 | 366 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 7.59E-03 | 15.25 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, exp($Pe^f$) (unitless) | Infinite source indoor attenuation coefficient, 0.1 (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 2.15E-05 | 2.15E-05 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 2.16E-05 | 2.16E-05 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 244 | |
| ER (1/hr) | 11.25 | |
| Sample depth (cm) | 381.25 | |
| $\eta$ | 0.0002 | - |
| Membrane Thickness | 0.00 | cm |
| Average $\alpha$ | 2.16E-05 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| $\eta$ liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 5.2E-11 | 5.9E-07 | Tetrachloroethylene | 6.38E+05 | 638 | 5.65E+07 | 56,493 |
| 1.8E-11 | 3.4E-08 | Trichloroethylene | 1.88E+06 | 1881 | 9.67E+08 | 967,184 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

0

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor

SG-ADV
Version 2.0; 02/03

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu$g/m$^3$) | OR | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|---|
| | 1 | | | | CAS No. not found |
| 127184 | 1 | | | | Tetrachloroethylene |
| 79016 | 1 | | | | Trichloroethylene |

Previous liner Deff calculation approach - no longer used

Totals must add up to value of Ls (cell F24)

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ (cm$^2$) |
|---|---|---|---|---|---|---|---|---|
| 366 | 381 | 19 | 381.15 | 0.1 | | SI | | |
| | 12.5 | ft bgs | | | | | | |

| ENTER Stratum A SCS soil type | ENTER Stratum A soil dry bulk density, $\rho_b^A$ (g/cm$^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ (cm$^3$/cm$^3$) | ENTER Stratum B SCS soil type | ENTER Stratum B soil dry bulk density, $\rho_b^B$ (g/cm$^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ (cm$^3$/cm$^3$) | ENTER Stratum C SCS soil type | ENTER Stratum C soil dry bulk density, $\rho_b^C$ (g/cm$^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ (cm$^3$/cm$^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lookup Soil Parameters | | | | Lookup Soil Parameters | | | | Lookup Soil Parameters | | | |
| SI | 1.35 | 0.489 | 0.1670 | | 1.5 | 0.43 | 0.42 | S | 1.66 | 0.375 | 0.054 |
| | | | | | Liner Properties | Diffusion coefficient Across liner (cm2/s) | Defect area ratio | | | | |
| | | | | | | 1.00E-08 | 1.00E-07 | | | | |

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ (g/cm-s$^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 11.25 | | 1 |
| | | | | 8 | | | | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 70 | 30 | 30 | 350 |

| Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$) | Henry's law constant reference temperature, $T_R$ ($^oC$) | Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Molecular weight, MW (g/mol) | Unit risk factor, URF ($\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) | Chemical |
|---|---|---|---|---|---|---|---|---|---|---|
| #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 7.2E-02 | 8.2E-06 | 1.8E-02 | 25 | 8,288 | 394.4 | 620.2 | 165.8 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 7.9E-02 | 9.1E-06 | 1.0E-02 | 25 | 7,505 | 360.4 | 544.2 | 131.4 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

**END**

**Attachment 1H**
**Subterranean Garage**
**Residential Receptor Scenario**
**With Controls**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | CAS No. not found |
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Tetrachloroethylene |
| 9.46E+08 | 15.25 | 0.322 | 0.010 | 0.321 | 0.267 | 6.85E-09 | 0.830 | 5.69E-09 | 4,000 | 1.00E+00 | 7.63E+05 | Trichloroethylene |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ ($atm\text{-}m^3/mol$) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.46E+06 | 1.62E-04 | 366 | #N/A | #N/A | #N/A | 1.78E-04 | #N/A | #N/A | 0.00E+00 | #N/A | 15.25 | CAS No. not found |
| 2.46E+06 | 1.62E-04 | 366 | 9,462 | 1.32E-02 | 5.52E-01 | 1.78E-04 | 6.92E-03 | 1.72E-08 | 0.00E+00 | 2.62E-06 | 15.25 | Tetrachloroethylene |
| 2.46E+06 | 1.62E-04 | 366 | 8,445 | 7.67E-03 | 3.20E-01 | 1.78E-04 | 7.59E-03 | 1.79E-08 | 0.00E+00 | 2.73E-06 | 15.25 | Trichloroethylene |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, 0.1 (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF ($(\mu g/m^3)^{-1}$) | Reference conc., RfC ($mg/m^3$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | #N/A | 4.0E+02 | #N/A | #N/A | #N/A | #N/A | #N/A | CAS No. not found |
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | 6.92E-03 | 4.0E+02 | 1.46E+26 | 5.42E-07 | 5.42E-07 | 5.9E-06 | 3.5E-02 | Tetrachloroethylene |
| 366 | 1.00E+00 | 0.10 | 1.67E+01 | 7.59E-03 | 4.0E+02 | 6.99E+23 | 5.63E-07 | 5.63E-07 | 2.0E-06 | 6.0E-01 | Trichloroethylene |

INCREMENTAL RISK CALCULATIONS:

**Inputs:**

| | | |
|---|---|---|
| Qsoil (L/min) | 1 | |
| HB (cm) | 244 | |
| ER (1/hr) | 11.25 | |
| Sample depth (cm) | 381.25 | |
| η | 0.0002 | - |
| Membrane Thickness | 0.10 | cm |
| Average α | 5.53E-07 | - |
| Target Risk | 1.00E-06 | - |
| Receptor | Residential | |
| D_liner | 1.0E-08 | cm2/s |
| η liner | 1.0E-07 | - |
| Leakage Factor | 3% | Indoor air leakage from 1st floor to second floor |

**Results:**

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) | | RBCs Target Risk 1.00E-06 ug/m3 | RBCs Target Risk 1.00E-06 mg/mg3 (ug/l) | RBCs Target HQ = 1 ug/m3 | RBCs Target HQ = 1 mg/mg3 (ug/l) |
|---|---|---|---|---|---|---|
| ERROR | ERROR | CAS No. not found | -- | -- | -- | -- |
| 1.3E-12 | 1.5E-08 | Tetrachloroethylene | 2.54E+07 | 25373 | 2.25E+09 | 2,245,470 |
| 4.6E-13 | 9.0E-10 | Trichloroethylene | 7.20E+07 | 71993 | 3.70E+10 | 37,025,041 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: CAS No. not found.
Note: Risks and hazard quotients reported above are based on unit soil gas source concentration (1ug/m3)

0

RBC = (Target Risk) / (Risk based on unit source concentration) / Leakage Factor
or
RBC = (Target HQ / (HQ based on unit source concentration) / Leakage Factor